The

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The Trans-Antarctic Expedition, 1955-1958

by SIR MILES CLIFFORD, K.B.E., C.M.G.

"This brave enterprise", as the Prime Minister called it last November in launching an appeal for funds, is backed by the United Kingdom, New Zealand, Australian and South African Governments to the tune of £188,000. Further support is guaranteed from various sources; but the organizers estimate that this will still leave £175,000 to be obtained from private donations. The author, formerly Governor of the Falkland Islands, is a member of the Committee of Management

The strange, stark continent of Antarctica has exercised a compelling attraction for explorers of all nationalities ever since it was first sighted by Bransfield more than 130 years ago—but how little we know about it! This is not altogether surprising for the way to it lies over the stormiest seas in the world and its barren, inhospitable shores are kept inviolate for most of the year by the encircling ice which has crushed many a good ship in its cold, relentless grip. Expeditions have planted themselves precariously, here and there, upon its periphery and have returned to add their small quota to our scant store of knowledge; few of them have attempted any serious penetration of the interior. The annals of these early explorers make fascinating reading.

But the fact remains that we are still profoundly ignorant of what goes on within and this is only too apparent if we take a look at the map. We see there a great white, circular mass nearly twice the size of the United States with a deep embayment on either side—the Weddell Sea and the Ross Sea which some suppose are joined beneath the ice-cap. Here and there one notes sections of the coast which have been mapped with some degree of accuracy, but it is probably true to say that the only area which has been extensively surveyed is the finger-shaped peninsula of Graham Land, where the Falkland Islands Dependencies Survey has been at work since 1944.

Now we have the exciting prospect of a Commonwealth Expedition which is to cross the continent from the Weddell Sea to the Ross Sea, a journey of about 2000 miles. This expedition is led by Dr Vivian Fuchs, Director of the F.I.D.S. Scientific Bureau in London, a traveller of wide experience who had already spent some two years in the Antarctic where he carried out two long sledge-journeys which gained for him the Founder's Medal of the Royal Geographical Society and the Polar Medal; he will bring to this great undertaking qualities of experience and leadership which would be difficult to match. The Expedition is split into two components: the Main Party, which will be based at Vahsel Bay on the Weddell Sea and will make the crossing via the Pole, and the Support Party led by Sir Edmund Hillary based at McMurdo Sound on the Ross Sea.

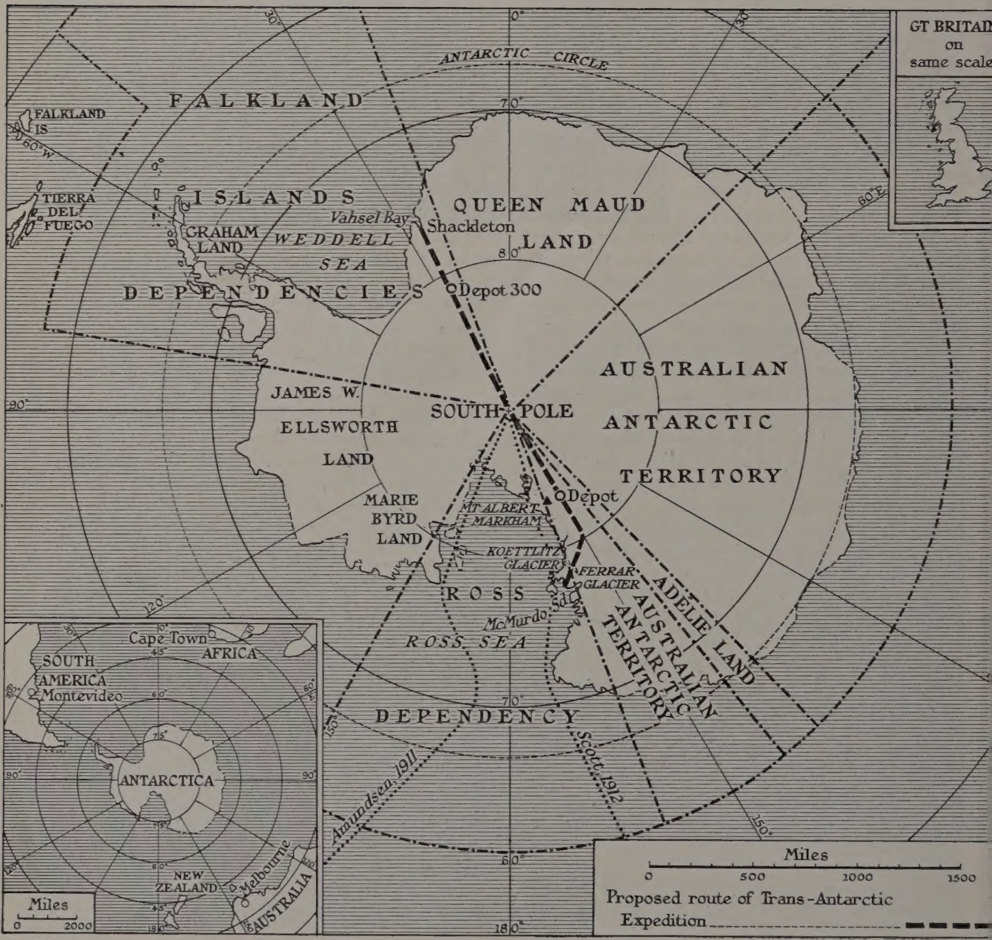
An advance party, including Fuchs, left London in the m.v. *Theron* on November 14 for Montevideo where Hillary and another New Zealand observer joined the ship and they hoped to sight Vahsel Bay early in January. Their first step will be to find some suitable point on the coast where the ship can lie and discharge her 300 tons of stores which must then be hauled to safety; that is to say, either to rock if there should be any in the vicinity, to inland (grounded) ice, or in the last resort to shelf-ice and in that case far enough in to ensure that it will not break away and carry the party off to sea.

So here, at once, they will be confronted with three problems: the penetration of the pack-ice in order to reach the coast; the locating of a suitable place at which the ship can lie in safety and discharge her cargo; and then the strenuous task of carrying this mass of stores and equipment to a site where the Base can be safely established. For the first two, they will be greatly assisted by reconnaissance from Auster light aircraft which will be flown by Squadron Leader Lewis, R.A.F., and Squadron Leader Claydon, R.N.Z.A.F.; the labours of the third will be eased, they hope, by tractors. But they will have to make the most of the long days which they can expect at this time of the year, for the ship must be away from the coast by the beginning of March at the latest. Eight men will stay behind to complete the erection of the pre-fabricated Base Hut and other essential buildings and the installation of the generators and wireless equipment; by April, with luck, they should be ready to start on their 'radiosonde' programme which will be an important part of the Expedition's scientific work. Dog-training must be taken in hand, too, and the American "Sno-Cat" tractor must be tested out, for when the winter ends the advance party has to carry out a good deal of inland reconnaissance. These will be busy months at the Base, which is to be named Shackleton, after the great explorer who first conceived this journey.

Meanwhile Fuchs and the other members of the advance party will have returned to London, and Hillary will fly back to New Zealand, to complete their preparations.

In November the Main Party will leave for the South in the m.v. *Magga Dan* (1600 tons), and at about the same time the Support Party will set off from New Zealand for McMurdo Sound; for the latter, the movement of the pack-ice can be better assessed and the conditions at their destination are well known from the records of earlier expeditions. The business of settling in should, therefore, be a good deal simpler for Hillary but he has a formidable programme in front of him, for it will be his responsibility to reconnoitre the Koettlitz and Ferrar glaciers down one of which Fuchs and his companions must descend at the end of their long journey; he must then lay a depot about 300 miles inland from which he will set out for Mount Albert Markham, about 500 miles from the Pole, where he will meet the crossing party and assist them on the last leg of their journey.

Having returned to Shackleton in about January 1957, Fuchs will establish a depot



A. J. Thornton

some 300 miles inland, the route to which may have already been reconnoitred in the previous November/December; he will be assisted in this task by Squadron Leader Lewis who will now be flying a de Havilland "Otter", a heavier, more powerful machine than the Auster and with a useful pay-load, which will enable it to ferry about a ton of stores at a time to the depot. One would hope to see this job completed before the end of autumn and a hut built there which will be occupied by a small meteorological party throughout the winter. Back at Shackleton the Main Party will be occupied with their scientific work, in testing the vehicles in which they are to travel, and with the hundred-and-one things which must be prepared before the great adventure begins. By the first days of spring everything should be ready and, in November, the travellers will set off via "Depot 300"—where they will pick up the meteorologists—and head direct for the Pole; they will stop every thirty miles or so to sound the depth of the ice-cap and will carry out geological investigations wherever opportunity, in the shape of exposed rock, permits.

As noted earlier, the party will be travelling in "Sno-Cats"; these are of comparatively recent design with four independent tracks. They have been tried out in the far North and it is hoped that they will stand up to the rugged conditions which the party are certain to encounter. They seem more likely to do so than any other mechanical vehicle but, in case of failure, dog-teams and sledges will be carried and Squadron Leader Lewis will leap-frog the travellers from time to time on their way across. If all goes well, they should meet the Support Party early in February 1958, for they must all be away from the Ross Sea in March, before the ice closes in again; upon Hillary's reconnaissance will depend the fate of the "Sno-Cats" for if they cannot be got down off the polar plateau, which means negotiating much difficult country and descending one or other of the two glaciers, then they will have to be abandoned.

Questions which are commonly asked about this journey are "What is its object?" "What kind of men go on it?" "Why does it cost so much?" "Is it worth it?" Fuchs answered the first of these questions himself last year: "We don't know what's there," he said, "and until we go there we can't find out!" One is reminded of Hillary's classic retort to someone who asked why men wanted to climb Everest: "Because it is there."

As to the second question, all sorts and conditions of men are included in this Expedition, compelled either by the challenge which the task presents, or by the fascination of the unknown, or by the call of companionship in a common cause, while some have been South before and must at all cost return. The motive is in every case a human and a generous one and the team has been hand-picked from a host of applicants. The crossing party includes two geologists (Fuchs himself and an Australian); two surveyors, both of them with previous Antarctic experience; two engineers; two meteorologists, of whom one is a South African; a seismic physicist; a radio operator; the R.A.F. contingent comprising two pilots and a mechanic; and George Lowe the Everest climber who accompanies the party as official photographer. Fuchs, at 47, is the oldest and his second-in-command Stratton, at 28, the youngest but one.

Much of the cost can be attributed to the chartering of specialized ships which, since they are in very short supply, is extremely expensive; this season the bill is £275 per day for a minimum charter of 150 days and next season it will be £425 per day for the same period. On top there will be ice insurance and besetment risks, and the New Zealand end has also to be provided for. Aircraft to meet the more exacting needs of the second year can be found only in Canada where they will have to be obtained at a cost around £65,000. Tractors add another £25,000; and all this before one starts on the food and the clothing and the thousand-and-one things which must be provided to keep a party in the field for over two years and on the long journey across the continent. It is not difficult to see why, despite the generous support of the United Kingdom and Commonwealth governments, the Expedition has had to appeal to the public to make up the balance; as the Prime Minister said in launching the appeal, "it is fitting and traditional that such a venture should be financed in part by government and in part by the public."

As to whether it is worth it, this depends entirely on one's sense of values; but with most people in this country there is very little doubt as to what the answer would be. Of course it is "worth it"; for if ever a time comes when a great challenge such as this should find no man to take it up, then, truly, we shall have had our day. If Fuchs and his men succeed, this will be one of the great journeys of history and an imperishable landmark in our proud record of polar exploration; if they should fail—and the difficulties which confront them must not be underestimated—they will have made a brave tilt at fortune. We shall be equally in their debt.

Kanchenjunga Climbed

by GEORGE BAND

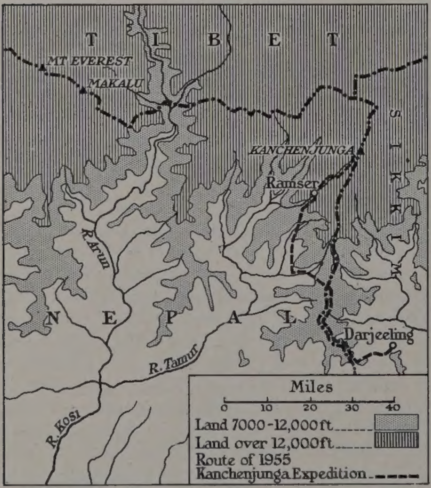
We are privileged to be able to publish this exclusive series of photographs brought back by the British team which successfully assaulted Kanchenjunga and the accompanying article specially written for us by one of the first pair to reach the summit. Neither the photographs nor the article, however, can convey an adequate idea of the skill, endurance and good fortune to which their truly astonishing achievement was due. Readers are therefore urged, if they possibly can, to attend one of the public lectures now being given by members of the Expedition; or, if not, to obtain the book of its adventures, shortly to be published by Messrs Hodder and Stoughton

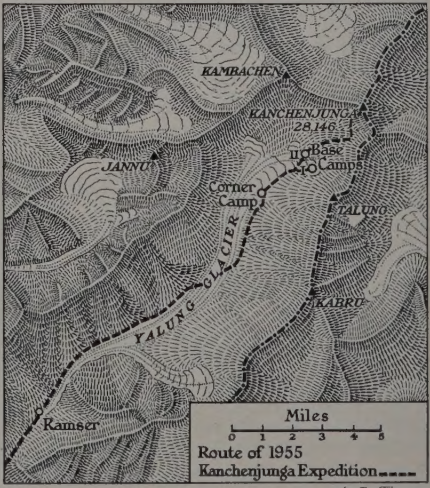
For climbers, the name of Kanchenjunga, the third highest peak in the world, is inseparably linked with tearing blizzards and thunderous avalanches. The large-scale expeditions of 1905, 1929, 1930 and 1931 found it completely unassailable. Sir John Hunt considered that its ascent would be "the greatest feat in mountaineering". A series of fresh visits to the south-west face in the 1950s initiated by Lewis and Kempe resulted in the totally unexpected success of Charles Evans' strong reconnaissance team last spring. Its members were: Norman Hardie, New Zealand civil engineer; George Band, Cambridge geologist; Joe Brown, Manchester builder; John Jackson, Yorkshire schoolmaster; Neil Mather, Manchester textile technologist; Tom Mackinnon, Glasgow pharmacist; Anthony Streather, Regular Army Captain; John Clegg, Liverpool University anatomist and Expedition doctor. Mackinnon, at 42, was the eldest and Brown, aged 24, was the youngest of the party.

The 1955 expedition's route from Darjeeling ran west and north a ten days' march to Ramser at 13,000 feet, where 300 porters deposited six tons of food and equipment on March 24. Thence it led up the Yalung Glacier past Corner Camp to the Base Camp at the foot of the Lower Icefall (see page 435).

George Band here takes up his own story of the ascent.

On Easter Sunday (April 10) Charles wirelessed me to join him at Corner Camp. I remember the day because our Darjeeling hosts had sent us by mail runner a huge chocolate Easter Egg filled with toffees. Evans and I were to be the first to occupy the Base Camp, which we did three days later. But the clouds descended and we lay in our tents listening to the none-too-distant rumble of avalanches while the wind, racing across the summit ridges from west to east, made a continuous far-off roar like that of a giant waterfall. There was still too much winter snow masking the buttress by which





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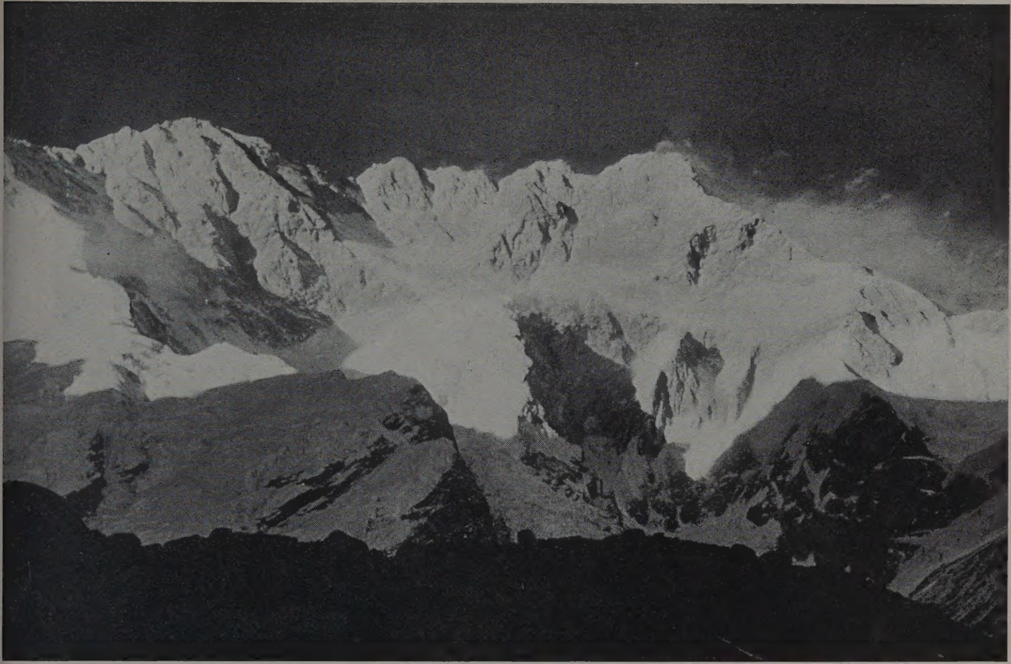


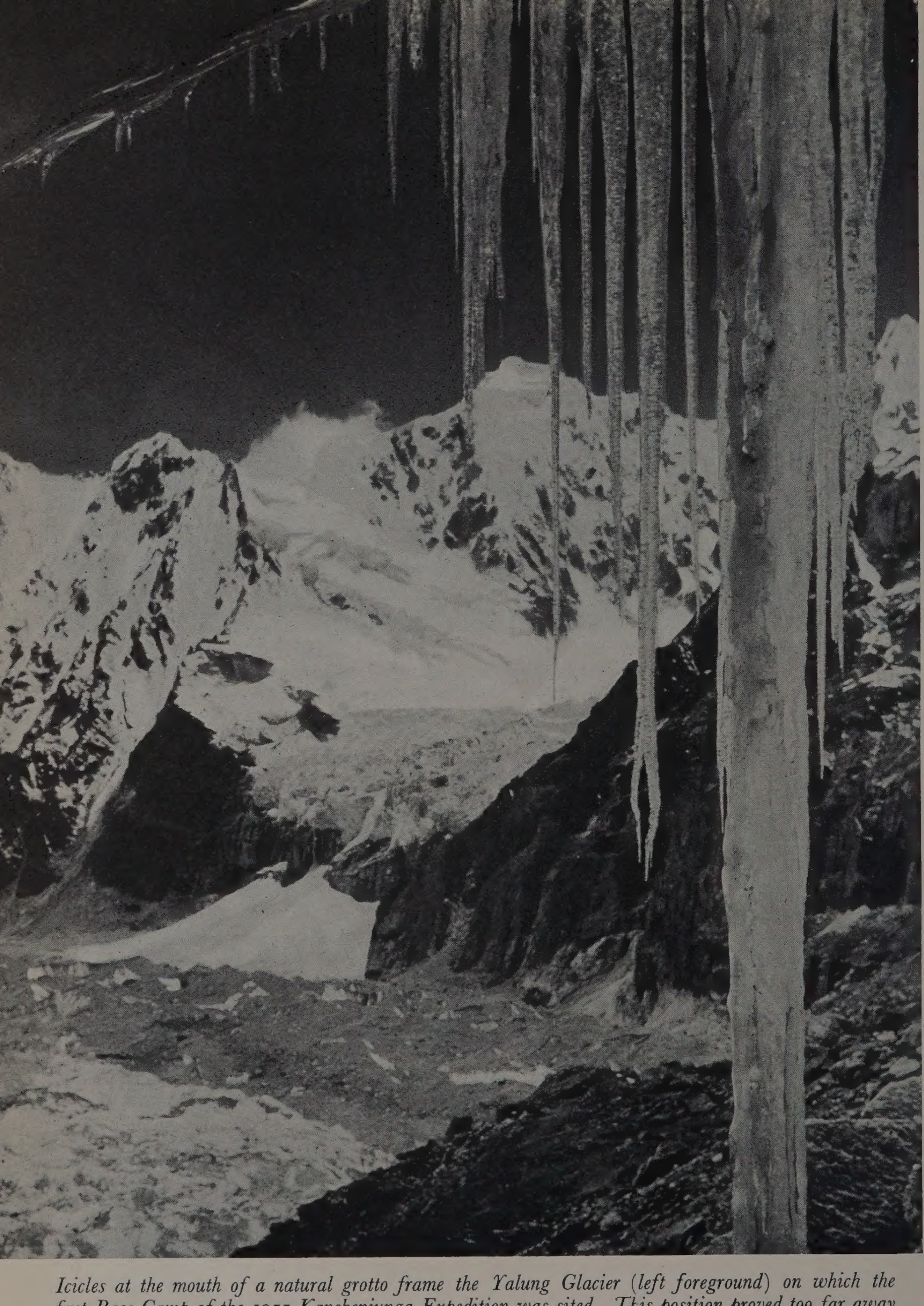
All photographs from the Kanchenjunga Expedition, 1955

The south-west face of Kanchenjunga seen from Corner Camp. The route taken by the 1955 Expedition lay by way of the brightly lit Upper Icefall to the conspicuous Great Shelf and thence by the Gangway to the 28,146-foot summit of the main peak to the left of the centre of the photograph

last year's party avoided the bottom half of the Lower Icefall. We had to retreat. The gods were still against us.

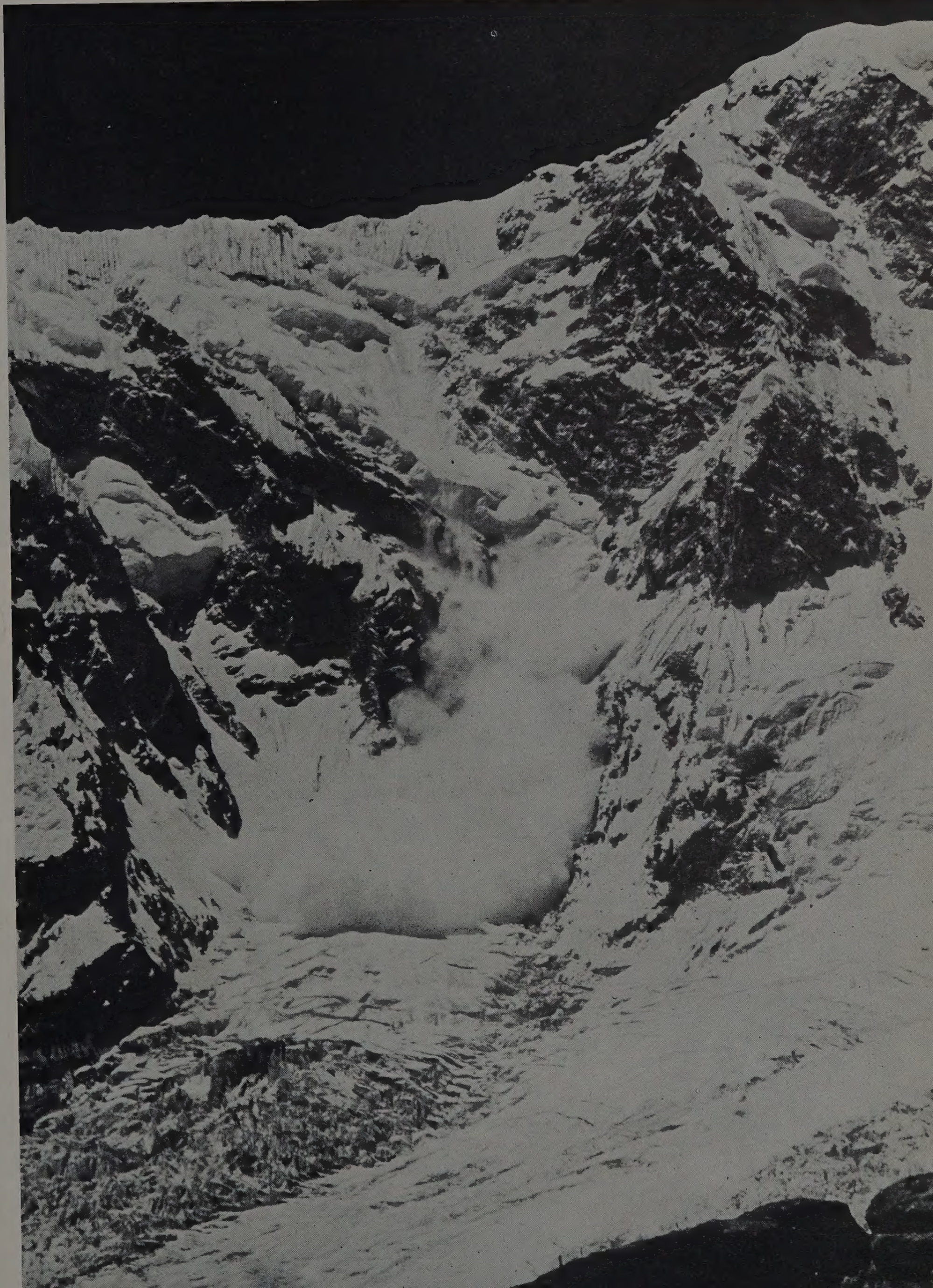
Three days later Norman Hardie, our two Sherpas and I tried again. We fixed 400 feet of rope on the steeper rocks and camped on the top of the buttress. We had always been mystified as to why the previous party had not penetrated the Icefall itself just here. Now that we could see it ourselves, we understood. The main mass of ice which rose in a sheer cliff was separated from the rock by a gaping chasm, precariously bridged in places by partly refrozen chunks of ice. "Let's see how far we can get this evening," said Hardie. I gulped, pretended I wasn't tired and tied sheepishly on behind. We made about four pitches in two hours. I got absolutely frozen standing motionless belayed in the shade beneath a kind of gigantic crystal-blue chandelier of ice with tiny caverns and tunnels running through it. Even though I was lashed to a rickety ice-piton, I didn't feel a bit safe. Norman was hacking away with incredible persistence and fashioning a five-yard horizontal traverse across the vertical wall to less steep ground beyond.

We spent two days of the most exhilarating ice-climbing of our lives, trying to find a way through before Evans and Jackson came to join us. Charles thought I was joking when I said that it made the Everest Icefall seem like a children's playground, but he soon agreed. The chief problem was to find a way up out of a valley whose upper wall, stretching across the icefall from side to side, was about fifty feet high, generally overhanging, and threatening to contribute at any moment to the blocks among which we were standing on the valley floor. Eventually we succeeded, after about six hours, in climbing the wall at a point where it was only vertical and about forty feet high. The last fifteen feet were overcome by artificial climbing. This was a new experience for Norman and, on ice, for me too. Soon he was playing me from below "dangling", as he put it, "like a puppet on strings". One moment, when I was perched thirty feet up on three crampon spikes, using both hands to insert a piton, I



Icicles at the mouth of a natural grotto frame the Yalung Glacier (left foreground) on which the first Base Camp of the 1955 Kanchenjunga Expedition was sited. This position proved too far away and the Base was moved up to a new one on the right-hand end of the ugly screes in the foreground

Avalanches were a constant menace to safety. Confined to his tent at the old Base Camp one stormy day, George Band chalked up forty-eight avalanches in sixteen hours—an average of one every twenty minutes. A gigantic cloud of ice-dust from one of them enveloped the camp in a two-minute 'snowfall'



Porters carrying stores over the hummocky glacier approach to the new Base Camp from the old one. Days were spent in the glacier's highly crevassed upper reaches, searching and hacking out a route; finally one member of the Expedition said proudly: "You could wheel a pram along it"

remember him shouting: "Wow! Show this to the New Zealand Alpine Club. Put your other foot on something, George, for God's sake." But there was more difficult ground ahead, and we knew already in our hearts that this icefall, unmistakably unstable, was not a place through which we could with any justification take our Sherpas. Were we to be defeated so soon?

Fortunately, a small snow-gully cleaving the Rock Buttress on the west side of the Lower Icefall proved the key to an outflanking movement by which this icefall was avoided except in its topmost section and Camp 2 was set up on April 28 at 20,400 feet on the snow-shelf separating the two great icefalls. Then, while carrying-teams stocked the camps, climbing-parties forced a route up the Upper Icefall.

Friday, May 13, was the Expedition's lucky day, for Evans and Hardie, in a lightning reconnaissance using oxygen, broke through to the Great Shelf and, trudging on towards the snow Gangway leading to the final West Ridge, reached a site for Camp 5 at 25,300 feet—higher now than man had ever been on Kanchenjunga. The climbers gathered to snatch a rest at Base Camp.

There was an air of expectancy about the camp as we awaited Charles' return. We knew that he would be allotting each of us a vital task during the assault. He came in during lunch and, with a mug of tea in his hand, quite suddenly told us his plans. Mackinnon and Jackson would lead Sherpa teams carrying vital stores to Camp 5. Then the first summit pair, Brown and I, with Evans, Mather, Dawa Tensing and three more Sherpas in support, would move up from camp to camp a day behind. Their supporting role was to put Camp 6—the last—as high as possible near the top of the Gangway. To double our chances of success, Hardie and Streather would form a second assault team, supported by two Sherpas, and they would follow up a day behind us. On the upward journey, the British members of the party would start using oxygen for climbing and sleeping above Camp 3; the Sherpas for the final carry above 5. It seemed a very efficient scheme, with nobody spending unnecessary time at high camps using up precious supplies. At supper we celebrated the occasion by opening

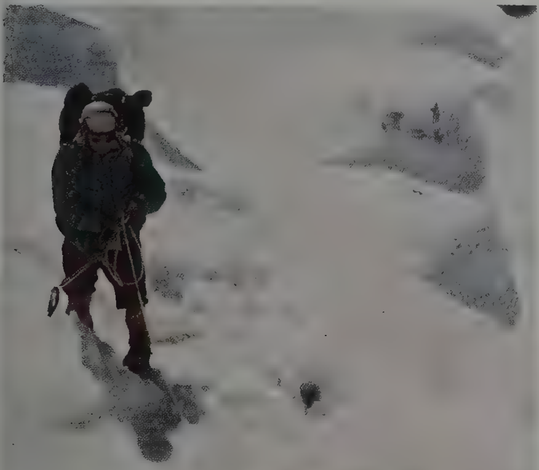
All colour reproductions are from Kodach

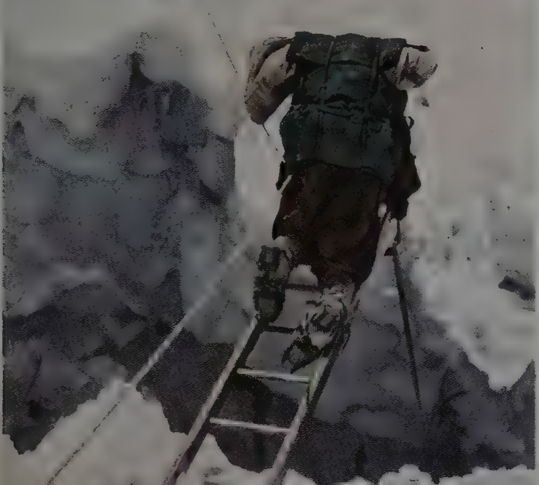
Sherpas preparing 45 lb loads at the new Base Camp for the "Low Level Ferry" to Camp 2 (20,400 feet). (Below) *Hardie, the deputy leader of the Kanchenjunga Expedition, working on the oxygen which was used on the assaults for climbing and sleeping at heights above 22,000 feet. A 1600-litre set weighed 24 lbs*

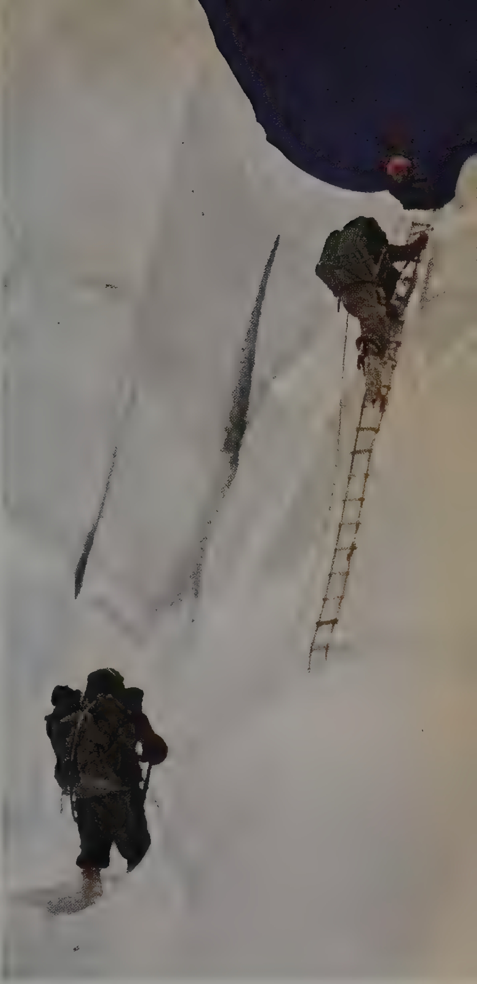
Dawa Tensing, the Sirdar of the Sherpas on the Kanchenjunga Expedition, was an old climbing-companion of Evans, the leader. A man of immense stamina, he twice carried stores up to 26,000 feet on the 1953 Everest Expedition. The Swiss named him "King of the Sherpas", thirty of whom he brought from Sola Khumbu to be high-altitude porters. Of these sixteen were equipped to go above 22,000 feet

(Right) *Captain Anthony Streather who partnered Norman Hardie on the second assault, on May 26. Kanchenjunga was the third mountain he had climbed. The first was a 25,000-foot peak in Chitral which, much to his amazement, he ascended in a golfing jacket with a Norwegian team; the second was an attempt on K2 with Americans in 1953. Since his return he has been persuaded to climb Snowdon.* (Below) *Charles Evans, the Leader of the Kanchenjunga Expedition (here having his hair cut by Joe Brown), is a Liverpool brain surgeon. He is regarded as the outstanding Himalayan climber and has spent the last six summers in the Himalayas. He was Hunt's deputy leader on the 1953 Everest Expedition, when he and Bourdillon reached Everest's southern summit—the highest climb ever made apart from that of Hillary and Tensing Norkey*

(Opposite) *Climbing the steep snow-slopes above Camp 1 to the "Hump"—the route by which the treacherous Lower Icefall was outflanked. Here in 1905 an avalanche of fresh snow overwhelmed the first Kanchenjunga Expedition. A single snowfall could make these slopes dangerous to cross and maroon the climbers above. Once Evans and Brown, being short of food at Camp 2, tried to descend. Suddenly the snow slumped and a sinuous crack ran out on either side of them. Speechless, they bolted back up, regardless of the lack of oxygen. Each day for fourteen days with monotonous regularity store-carrying parties stocked higher camps: the "Low Level Ferry" from Base to Camp 2 and back was a two-day journey; the "High Level Ferry" return-trip from Camp 2 to Camp 3 was done in a day. An early start was best, but few camps received the morning sun before 9 a.m. so preparations were hampered by bitter cold. As the route and the weather gradually improved the Ferry parties returned earlier each day, eventually getting back for morning coffee*

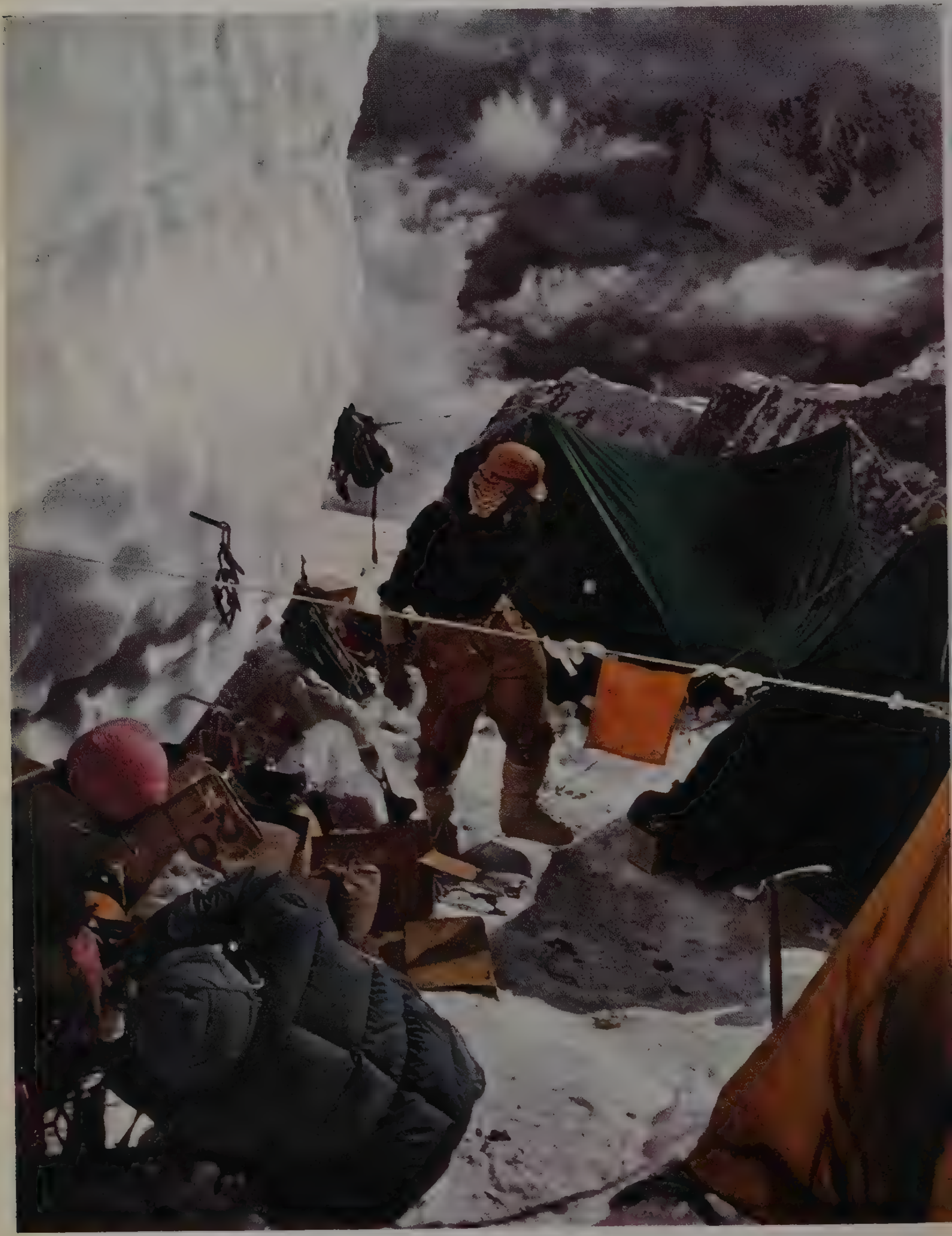


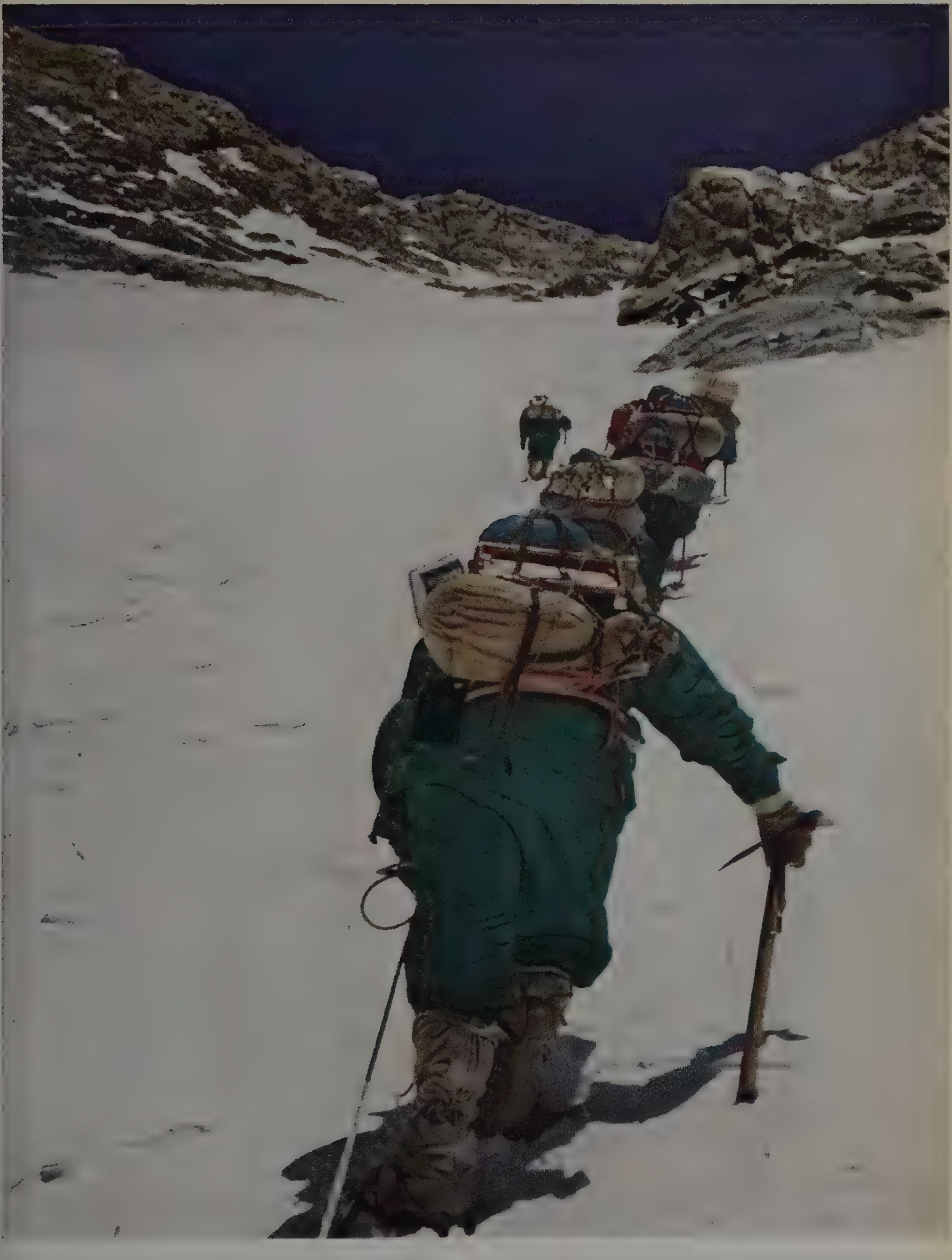




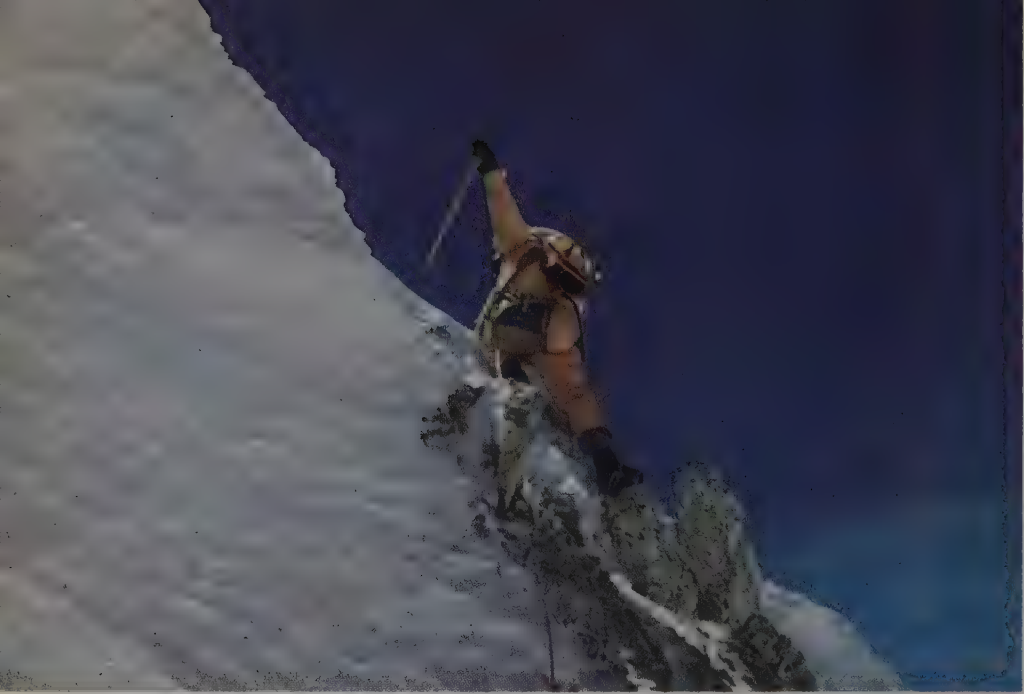
(Above) *This rampart of ice guarded the top of th Lower Icefall. It was originally climbed direct but here a rope ladder eases the passage for th Sherpas of a Low Level Ferry party in the charg of Jackson, between Camps 1 and 2. At the to one emerged breathlessly onto the soft snow shel and dragged oneself the last few yards to Camp 2*
(Left) *The last part of the Low Level Ferr route to Camp 2 crossed the jumble of shattere blocks at the top of the Lower Icefall. A heavil loaded Sherpa crawls over the light metal ladde bridging the chasm between the Hump and the Ice fall, safeguarded by his companion. British mem bers of the team always accompanied the Sherpas t take responsibility and share the risks and danger*

Halfway up the Upper Icefall at 21,800 feet on a restricted ledge was Camp 3, safely situated beneath a great icy overhang. Below, the ice walls and shelving snow ledges fell towards Camp 2. Before the assault could begin, a ton and a half of stores were carried here by the High Level Ferry

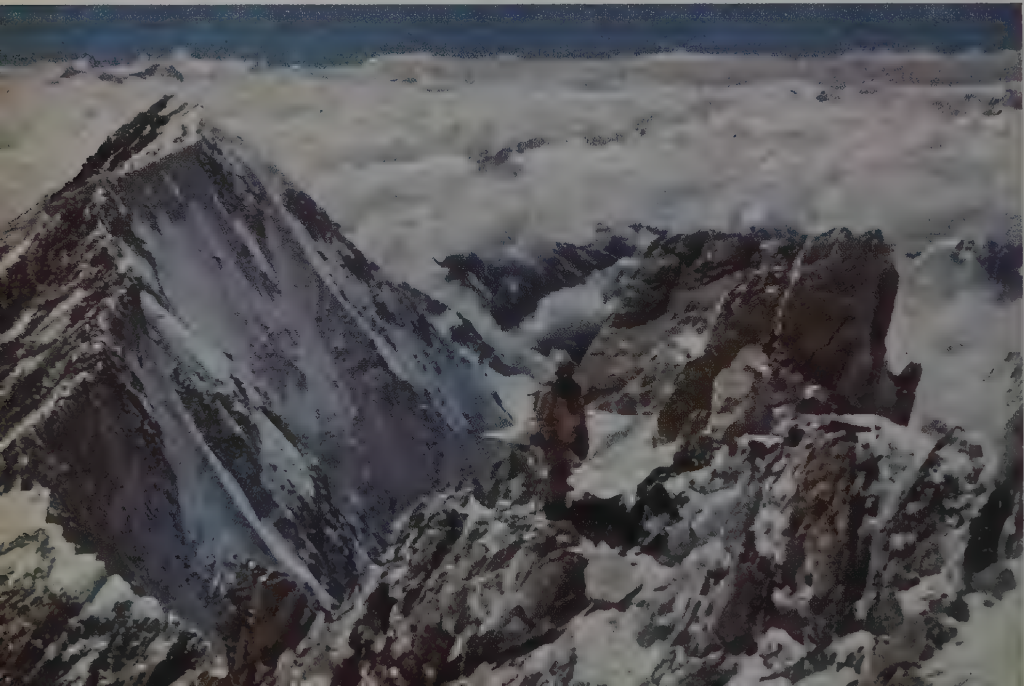




Evans, Neil Mather and Dawa Tensing lead up the Gangway at 26,000 feet on the way from Camp 5 to the final Camp. With three other Sherpas they supported the first assault pair. All used oxygen and carried loads up to 40 lbs. This part of the ascent of Kanchenjunga was made once only by twelve men



(Above) *Band, photographed by Brown, on the Gangway soon after leaving Camp 6 for the first assault on May 25. They reached the near-summit at 2.45, returning, largely without oxygen, as darkness fell.*
(Below) *Kambachen, with Everest eighty miles beyond it, from above 28,000 feet on the first assault*



our second and last bottle of rum to make a hot lemon punch.

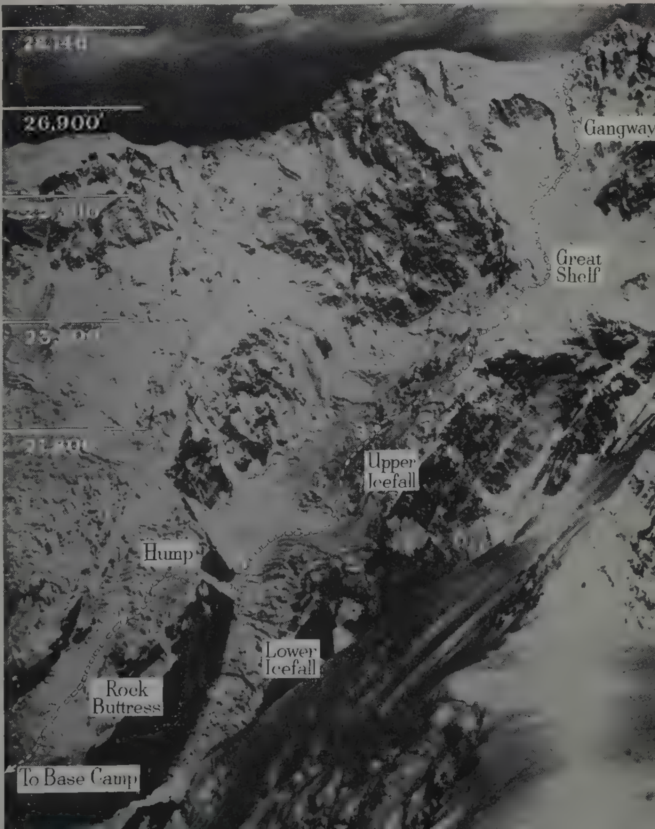
The carry to Camp 5 only just succeeded. Mackinnon and five Sherpas reached the site but Jackson, who was snowblind, and four other Sherpas nearing exhaustion had to dump their loads on a steep slope short of the camp—or risk being benighted which would mean almost certain death. That night a blizzard began which imprisoned the first assault group in their tents on the barren windswept shelf at Camp 4 (23,500 feet).

For sixty hours the storm raged over us. Then on the morning of the third day—May 22—Tashi, my own personal Sherpa, looked out and shouted excitedly: "Sahib, it's clear. I can see all the way round from Darjeeling to Everest." Now we could get going for Camp 5—a four-hour journey we thought—but we didn't allow for struggling through the new snow-drifts nor for the furious gusts of wind in our faces. It was late in the afternoon before we reached the ice-slope below the supply dump. We were tiring, our oxygen had just run out, and then to our horror we discovered that the stores were no longer there. Fresh snow higher up had avalanched and scattered the tents, oxygen cylinders, kerosene, cookers and food all over the slope. We had to recover all we could, add it to our loads, and then, gasping for breath, plod the last few yards to the camp-site. They were the longest yards on the whole expedition. My companions' faces were blue with cold, ice caked their eyebrows and beards, but we couldn't rest yet. In the fierce cold of the gathering twilight, we battled against the wind to rig up our tents and at last crawled thankfully inside to make tea and sleep.

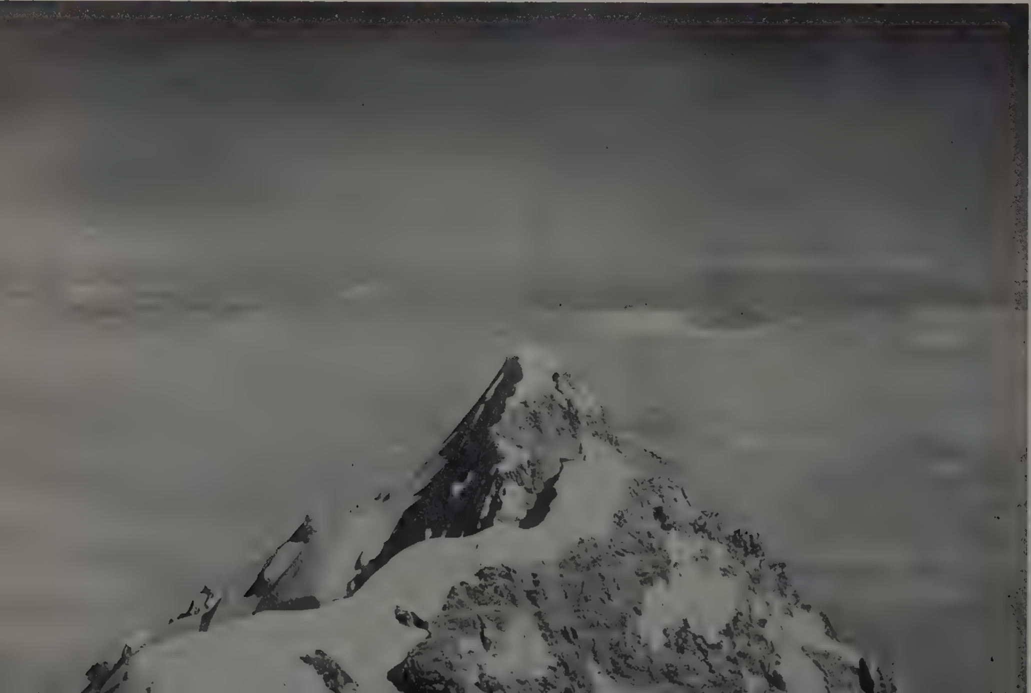
We were too tired to make an early start next morning, so we delayed everything by a day. The Sherpas started melting snow at 4.30 a.m. but not until nine did we get away, in the bitter cold before the sun had reached our tents. We had always wondered about the snow on the Gangway. It was steep but good and firm; three strokes with the ice-axe made a step. After four hours, with few pauses to rest, we began, one by one, to run out of oxygen, but strove step by step to gain all the height we could. At nearly 27,000 feet we reached some broken rocks but there was no place for a tent. Instead, we had to cut a ledge out of the 45° ice with our axes. The exertion was proving too much for us when I noticed that Tashi's set still had some oxygen left—he must have climbed with it switched off for an hour without realizing! I buckled it on and with the supply valve full on gained an extra burst of energy. Even so, the ledge was too narrow for we had hit rock at the back and the tent hung sadly over the outside edge. The others departed shouting, "Good luck", and Joe Brown and I were left alone to decide who should sleep in the outside position. We drew matchsticks and I lost!

You get terribly thirsty high up, so, while I got the sleeping oxygen ready, Joe brewed up. We had lemonade made from crystals, tea with lots of sugar, then asparagus soup

The route of the 1955 Kanchenjunga Expedition with positions and altitudes of the camps, and the main features mentioned



(Above) *Looking south-west at the upthrust fang of Jannu (25,294 feet) from high on the West Ridge during the first assault.* (Below) *The subsidiary 27,803-foot south peak of Kanchenjunga, from the near-summit. Out of respect for the Sikkimese, who hold the mountain sacred, the very top was left untrodden*



Two further views from the near-summit of Kanchenjunga: (above) *south-south-west over Talung Peak (23,080 feet) and the white table-top of Kabru (24,000 feet) towards the cloud-covered plains of India;* and (below) *north to the highlands of Tibet with the peaks of the Jonsong group in the middle distance*

from a packet, a tin of lambs' tongues with mashed potatoes, and finally a mug of drinking-chocolate. Then we crawled into our sleeping-bags. We didn't take off any of our windproof or warm eiderdown clothing. We even kept on our special high-altitude boots; otherwise, like Hillary's on Everest, they would have frozen hard. I wore my boots solidly for three days and nights during the assault. As we lay side by side little bits of snow kept skittering down the slope and hitting our tent. I wondered what would happen if a really big lump or a stone came. We had stayed roped up just in case, tying the middle to a rock spike close to the tent. I prayed for good calm weather otherwise we wouldn't stand a chance. However high we got, ours would be an unusual climb because we had already promised not to stand on the actual summit. We had done this in order not to offend the Sikkimese who accord to Kanchenjunga—the five Sacred Treasuries of the Snows—the reverence due to a god.

May 25 dawned fine and soon after eight Joe and I started off up the Gangway. We planned to turn off right after a while and climb across the rocky face because we had seen earlier through binoculars that the West Ridge itself was very broken and difficult. Unfortunately, we erred in route-finding, turning off too early, and wasted an hour and a half of precious time and oxygen. So we hurried on as fast as we could to make up. But the climbing was often too hard for us to move safely together; then one of us would take a secure stance while paying out the rope which safeguarded the other. At two o'clock we joined the West Ridge above its difficult part and stopped for a quick snack of lemonade, toffees and mint cake. I was tiring. We only had a couple of hours' oxygen left so I said to Joe: "We must turn back by three or we may have to spend the night out." "We've just got to reach the top before then," he answered.

The climbing was easier now and we could move together, but above us a final nose of rock seemed to bar the way. Would it defeat us? On the right-hand side the wall was broken by several vertical cracks about twenty feet high, ending in a slight overhang. Joe chose one and forced his way up—it was the hardest part of the whole climb. Then he turned and shouted: "George, we're there!" I joined him, and there before us, some twenty feet away and five feet higher than the ground on which we stood, was the very top, formed by a gently sloping cone of snow. We had come as far as we were allowed by our promise.

It was a quarter to three. We took photographs of each other and of the view round about. There was a great sea of cloud at 20,000 feet, so only the highest peaks stood out like rocky islands with the waves lapping around them. To the west were the giants, Makalu, Lhotse and Everest, eighty miles away, deep blue against the faint horizon. We turned to descend. After an hour the oxygen finished and we threw the sets away and carried on feeling very weary. I was crossing a patch of unstable snow when suddenly my foothold broke. I slipped, rolled over and dug my axe-point into the snow to arrest myself. In a second I had stopped but the effort made me pant, while Joe said: "Don't do it again, George, it makes me tired to watch you."

We reached our tent as darkness fell. As planned, Hardie and Streather had arrived there ready for a second attempt in case we had failed. We should really have gone on down to Camp 5 but in the dark it was too dangerous. So the four of us squeezed into that tiny two-man tent overlapping its narrow ledge and they plied us with tea and soup over and over again. I've never felt so thirsty in my life before. There was no tossing up for the outside position this time. They reckoned I knew all about it, so there I went. We insisted that Hardie and Streather should use the sleeping-bags as they still wanted to have a crack at the top. The canvas kept creaking in the night and as I hung out there in space I wondered: "What happens if the stitching goes?"

In the morning Joe and I set off down while Hardie and Streather repeated our ascent. They followed the same route, except at the very top, where they looked at our vertical crack, didn't like it, so walked on a few yards round a corner and there was a perfectly easy snow ridge running right to the summit! They climbed fast, but had a stroke of bad luck on the way up; one of their larger oxygen bottles worked loose from its frozen straps and, slipping over the rocks below them, slid out of sight down the face. As a result, Streather had to make the whole of the descent without oxygen and they too reached Camp 6 exhausted.

Evans was waiting for them at Camp 5. Early next morning he spotted the two tiny figures staggering, unsteady with fatigue and lack of oxygen, down the final slope. He called out: "Did you get to the top?"

"Who won the General Election?" was Hardie's only reply. They had come back.

Explorers' Maps

XI. The New World in the 16th Century

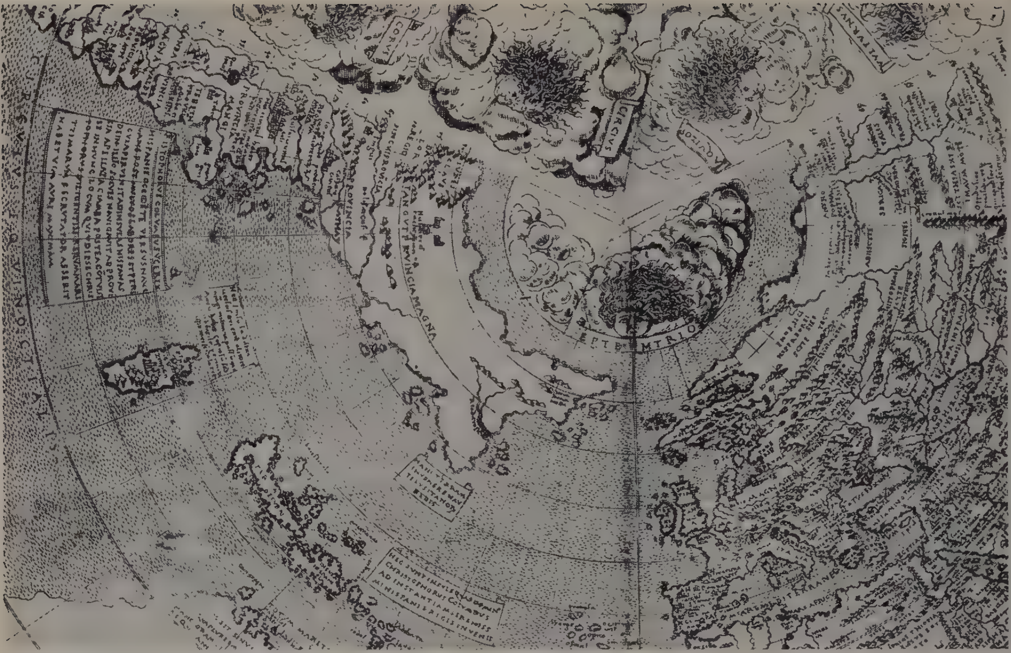
by R. A. SKELTON

This series of articles by the Superintendent of the Map Room at the British Museum presents, in regional order, some episodes in the history of exploration for which the evidence of maps is specially interesting or accessible. The text is to be read as a commentary on the maps and not as a connected history of discovery. After surveying here the cartographic approach to the coasts of the New World, Mr Skelton will deal in his next article with the exploration of North America

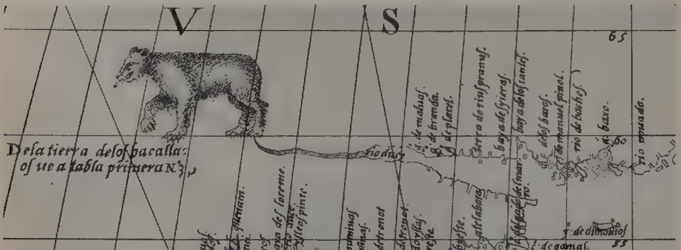
BEFORE Balboa set eyes on "the greate mayne sea heretofore unknowen" in 1513, before Magellan's crossing of the Pacific in 1520-21, mapmakers had given the "new world" of America a continuous Atlantic seaboard from 50° N to 40° S. Whether this fourth continent had any land connection with eastern Asia across the north of the Pacific was a question which received no answer for over two centuries. Yet Cathay and the Spice Islands remained the objective for westward exploration throughout the 16th century, and the search for a seaway through the American continent continued until its existence was finally discredited in the 18th century. Parallel with the quest for a western passage grew the concept of settlement and empire, nourished on the one hand by realities—the fabulous conquests of Spain in Mexico and Peru, the rich fur trade of Canada—and on the other by travellers' tales and evocative myths—kingdoms of gold, the Fountain of Everlasting Youth, the Seven Cities of Cibola, El Dorado. In the pursuit of these, the map of America was gradually pieced together.

The new world, with the exception of Brazil, lay on the Spanish side of the Tordesillas demarcation line, and Spanish cartography of the "Indies" was from the first carefully organized. In the Casa de la Contratación (or Board of Trade) of Seville, the governing body of Spain's territories overseas, the Pilot Major was responsible for the instruction of pilots and for the examination of sea-charts. On his appointment in 1508 the first Pilot Major, Amerigo Vespucci, was ordered to draw up a royal *padrón general* (master chart) "of all the lands and islands of the Indies", and to ensure that no pilot used any chart not drawn from the padrón. As a kind of inventory of the lands discovered, settled, or claimed by Spain, the padrón general was kept up-to-date by continuous addition and correction from the charts brought back by pilots and explorers. Although its revision was a fruitful source of discord among the cosmographers of Seville, it supplied a systematic record of known coasts and new discoveries such as no other nation disposed of; and to the bureaucratic administration of the Casa de la Contratación is due the survival of many Spanish charts of the 16th and 17th centuries, although few were printed (Figs. 2, 8). By contrast, the maps of early French and English explorers suffered heavy mortality. The pages of Richard Hakluyt abound in references to maps now lost—the "Sea card" of John Cabot, Sebastian Cabot's world-map "the copye whereof was sette out by Mr Clemente Adams and is in many marchantes houses in London", Jacques Cartier's maps, "an olde excellent map which [Master John Verarzanus] gave to Henrie the eight, and is yet in the custodie of master Locke", a globe "in the Queenes privie gallory at Westminster w^{ch} also semeth to be of Verarsanus making", and many others.

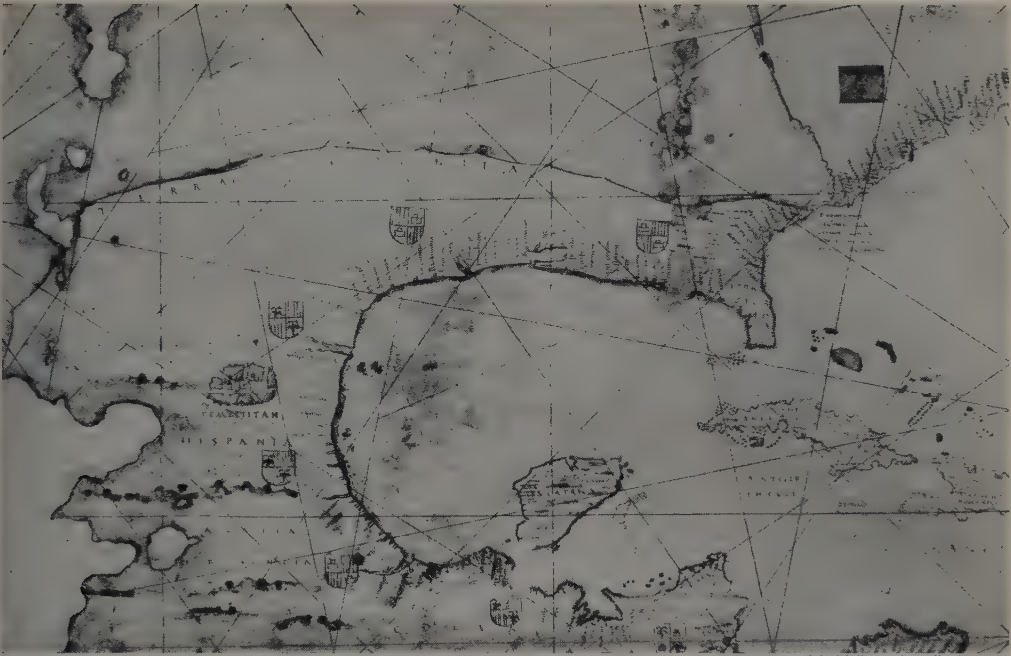
Of the two voyages for Cathay set forth by John Cabot from Bristol in 1497 and 1498, we have neither his journals nor his maps. The geographical ideas which prompted his enterprise, and in the light of which he identified his North American landfalls, are illustrated by the Contarini map which, to the north of the oceanic islands discovered by Columbus, depicts a great promontory extending from north-east Asia into the Atlantic (Fig. 1). Cabot's tracks, as indicated by the evidence of early maps and by the conflicting recollections of his son Sebastian, have been variously interpreted. His "Prima vista", or first landfall, may be Cape Breton (as in the map of 1544 ascribed to Sebastian Cabot; Fig. 2) or Cape Bonavista in Newfoundland; Hakluyt and some later writers suppose him to have coasted as far south as Florida. Cabot was followed by the brothers Corte-Real who, in three expeditions under the Portuguese flag in 1500-2, redis-



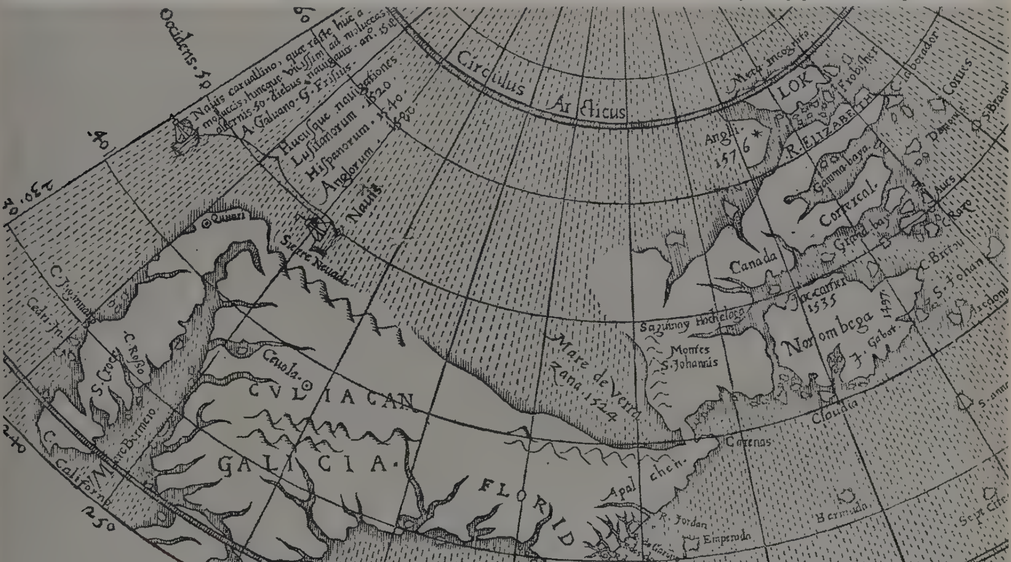
All illustrations, except two, from the British Museum

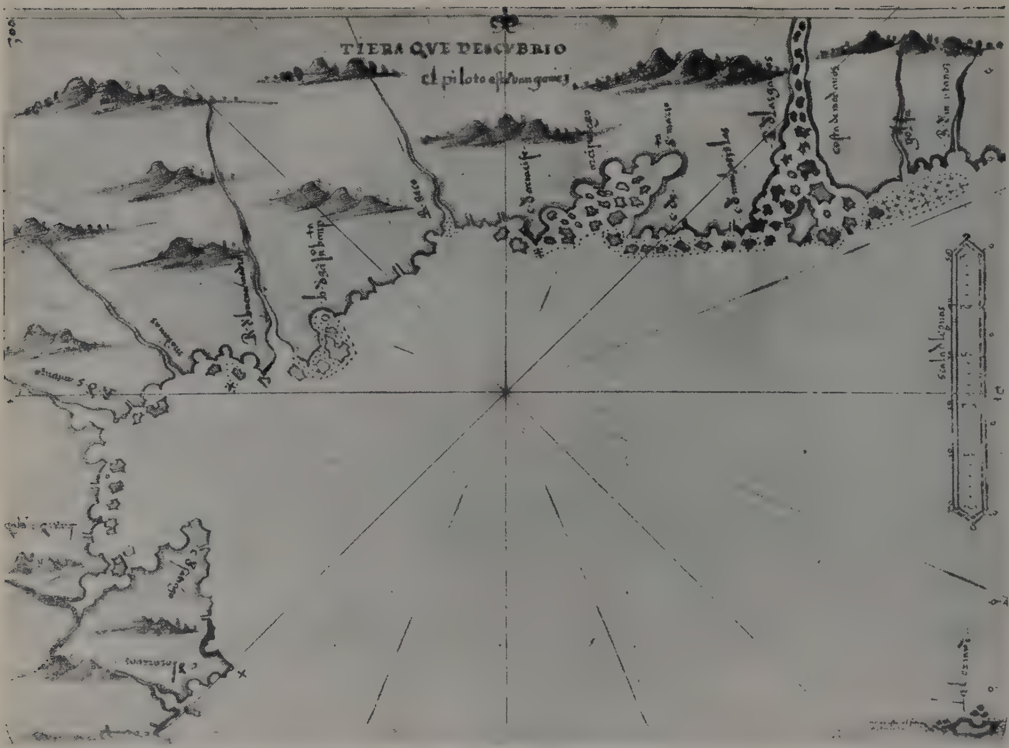


(*Fig. 1 :* above) *In the world map of G.M. Contarini (1506), the North American discoveries of John Cabot and the Corte-Reals are shown as a land extension of Marco Polo's Cathay.* (*Fig. 2 :* left) *Part of a world map engraved in 1544 from a* padrón general *and ascribed to Sebastian Cabot, then Pilot Major of Spain. The landfall of John Cabot in 1497 at Cape Breton is here named "Prima tierra vista".* (*Fig. 3 :* opposite, top) *In Girolamo de Verrazano's map (1529) the supposed isthmus discovered by his brother bears the legend: "From this eastern sea you may behold the western sea and there are six miles of land between them".* (*Fig. 4 :* opposite, bottom) *Michael Lok's map, drawn "from Verrazano's plat" and published in 1582 to support English colonial claims in North America, records the discoveries of explorers from John Cabot (1497) to Frobisher (1576)*



By courtesy of the Biblioteca Apostolica Vaticana

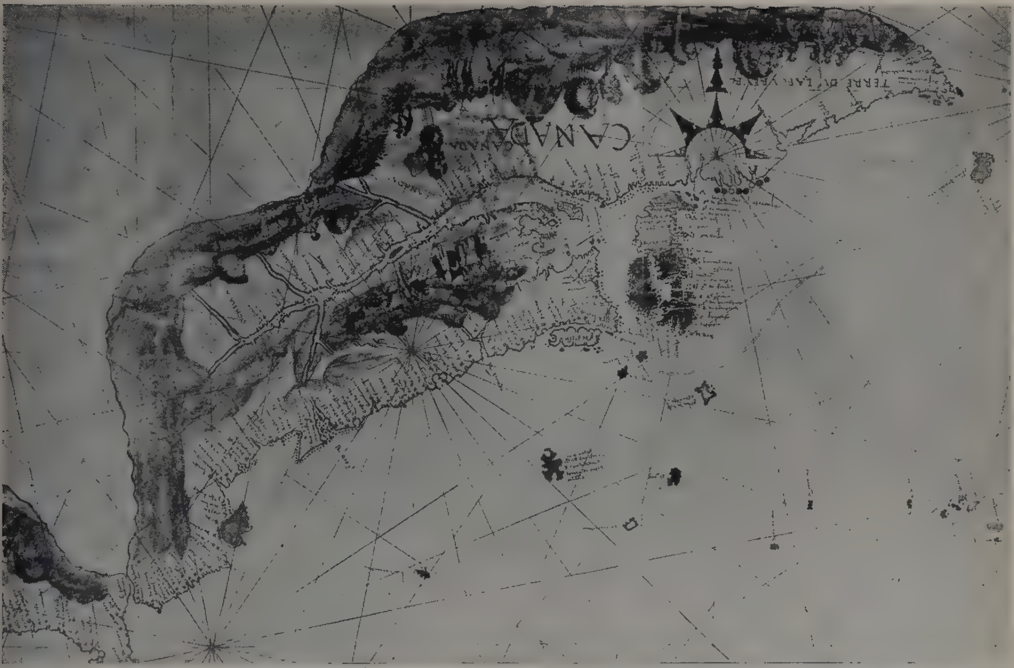




(*Fig. 5*) "*The land discovered by the pilot Estevan Gomez.*" *This chart by Alonso de Santa Cruz, Royal Cosmographer of Spain, depicts the coast of New England which Gomes explored in 1524-5, from Cape Cod (or further south) to the Penobscot River in Maine, with the names given by him*

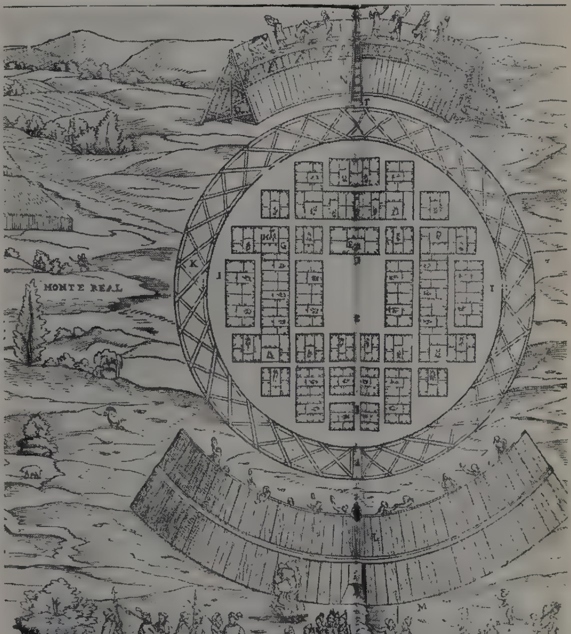
covered Greenland, navigated the east coast of Newfoundland, and perhaps penetrated into the Gulf of St Lawrence (Figs. 2, 4). The entrance of Hudson's Strait may have been found by the Portuguese and was probably reached by Sebastian Cabot on a voyage of 1509. By this date it was plain that the continental lands revealed by his father's voyages bore no resemblance to Marco Polo's Cathay, and Cabot's venture was undertaken in the belief "that a passage might bee founde to Cathay by the north seas, and that spices might bee brought from thense soner by that way, then by the vyage the Portugales vse by the sea of Sur". After being turned back by ice and mutiny in 67½° N, Cabot sailed south-west from Labrador to 38°, the latitude of Virginia (Fig. 2).

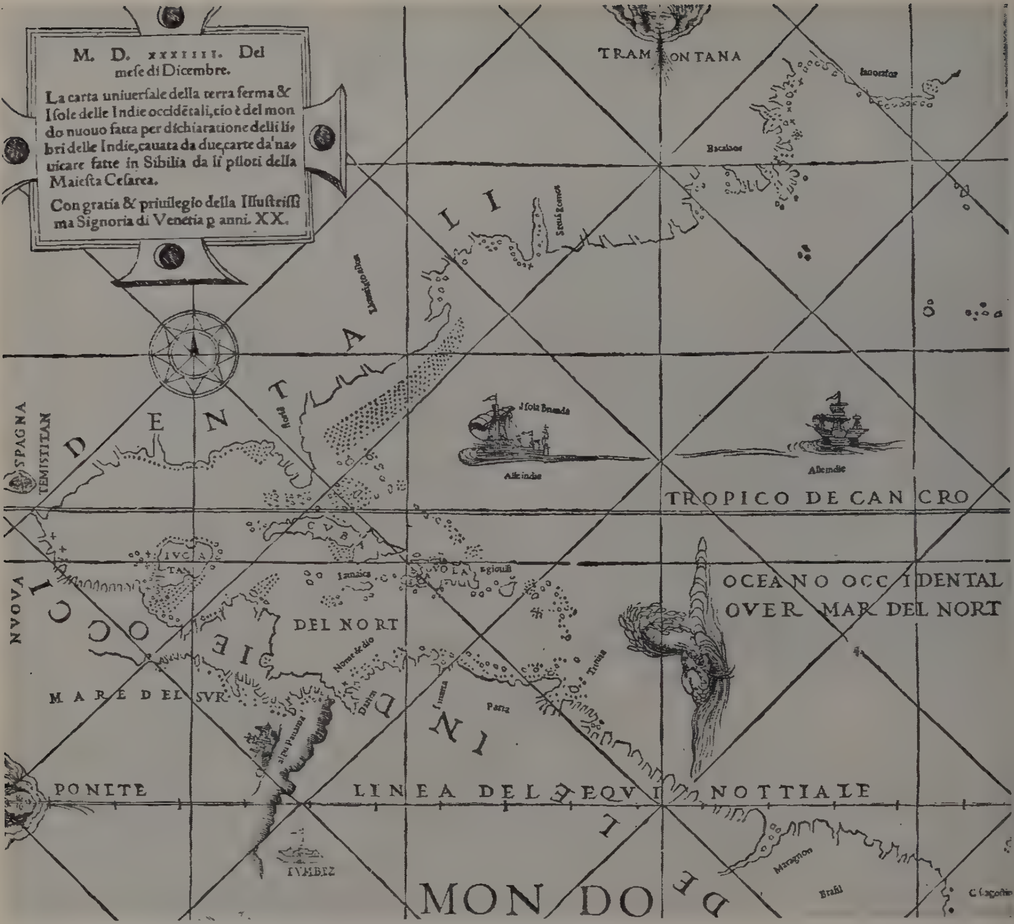
The charting of the Atlantic seaboard of North America was completed by coasting voyages made under the Spanish and French flags in search of a western sea-lead. The Spaniards, naturally apprehensive of such a discovery to the north of their Caribbean colonies, despatched Estevão Gomes in 1524 with orders "to examine all the coast from Florida to Baccalaos [Labrador], whether any passage can be found leading to the kingdom of the Great Khan". Gomes, a Portuguese pilot who had deserted from Magellan's expedition before it reached the Pacific, had a personal interest in discovering a more direct passage than that by the strait named after his rival; and the voyage in which he examined "every bay, creek, river, and inlet, whether it extended over to the other side [of the land]", can be traced in the charts of the royal cosmographers in the Casa de la Contratación (Fig. 5). Meanwhile in 1523 the King of France, whose ships had captured the Mexican treasure sent home by Cortes, despatched Giovanni da Verrazano, a Florentine exile living at Dieppe, "on the discovery of Cathay". On his second voyage, in 1524, Verrazano navigated and charted the American coast from 34° N, near Cape Fear, to



(*Fig. 6 :* above) *Canada and the St Lawrence river, in a world map drawn about 1544, perhaps by Pierre Desceliers of Arques near Dieppe. The representation, no doubt derived from the lost maps of Jacques Cartier, illustrates his exploration of the river and its basin on the three voyages of 1534, 1535-36, and 1541-42. The Indian name "Canada" (three times repeated) is given to the region north of the river; and, beyond the junction of the Ottawa and St Lawrence rivers ("Ochelaga", on the site of Montreal), Cartier's furthest west is marked by the name of his home-town St Malo. To the west lies the ocean which Cartier sought. The conjectural strait linking it to the Atlantic further south may be compared with Giovanni da Verrazano's "isthmus" (Fig. 3).*

(*Fig. 7 :* right) *Plan of the "city" of Hochelaga in New France, illustrating a narrative of Cartier's second voyage. In front of the stockades of their town below "Monte Real", Huron Indians greet the Frenchmen*

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Con gratia & priuilegio della Illuſtriſſima Signoria di Venetia p anni. XX.
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Bacalaos
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OVER MAR DEL NORT
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Maragnon
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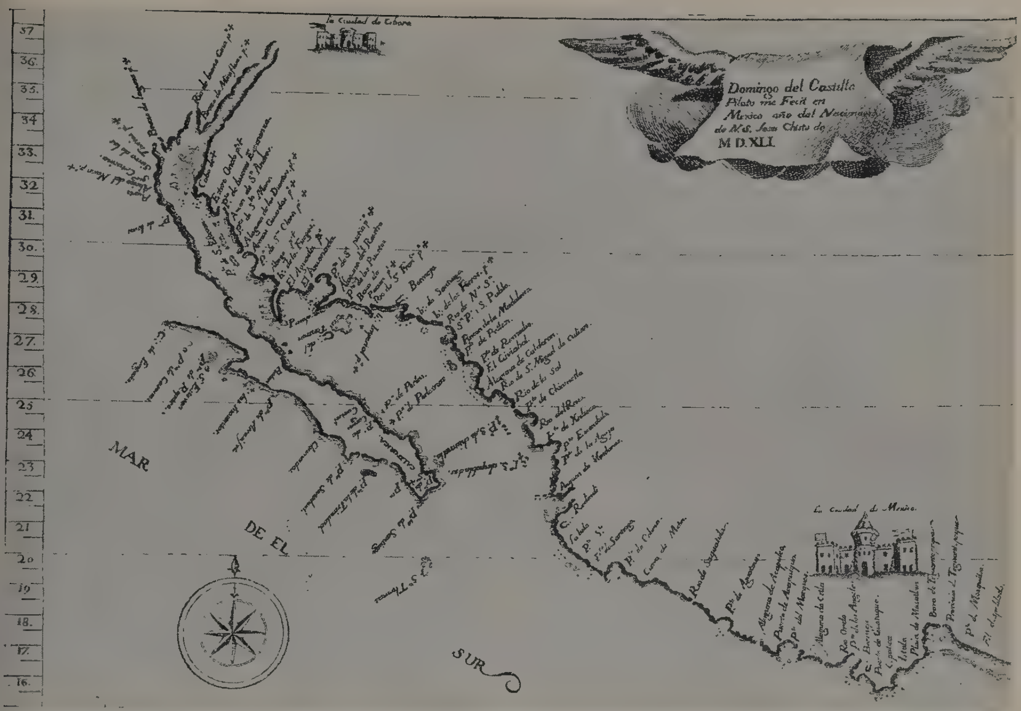
DEL MONDO

(*Fig. 8:* above) "*Universal map of the mainland and islands of the West Indies of the new world, taken from nautical charts made in Seville by the pilots of his Imperial Majesty*": *engraved at Venice in 1534. The Caribbean islands are accurately drawn, but Yucatan still appears as an island;* "*Temistitan*" (*Mexico*) *and* "*Tvmbez*" (*in Peru*) *represent the latest conquests of Spain. The Atlantic coastline of North America is marked* "*Steuã Gomes*". *Ships indicate routes to the West Indies and Panama.* (*Fig. 9:* opposite, top) *The Gulf of California: a chart drawn at Mexico in 1541 by Domingo del Castillo, a pilot in the second of two Spanish fleets which navigated the gulf in 1539-40 and 1540-42. Their tracks are indicated by the coastal names.* (*Fig. 10:* opposite, bottom) *The north shore and hinterland of the Gulf of Mexico, by Santa Cruz. The numerous Indian settlements inland were reported by the survivors of De Soto's expedition on their return in 1543*



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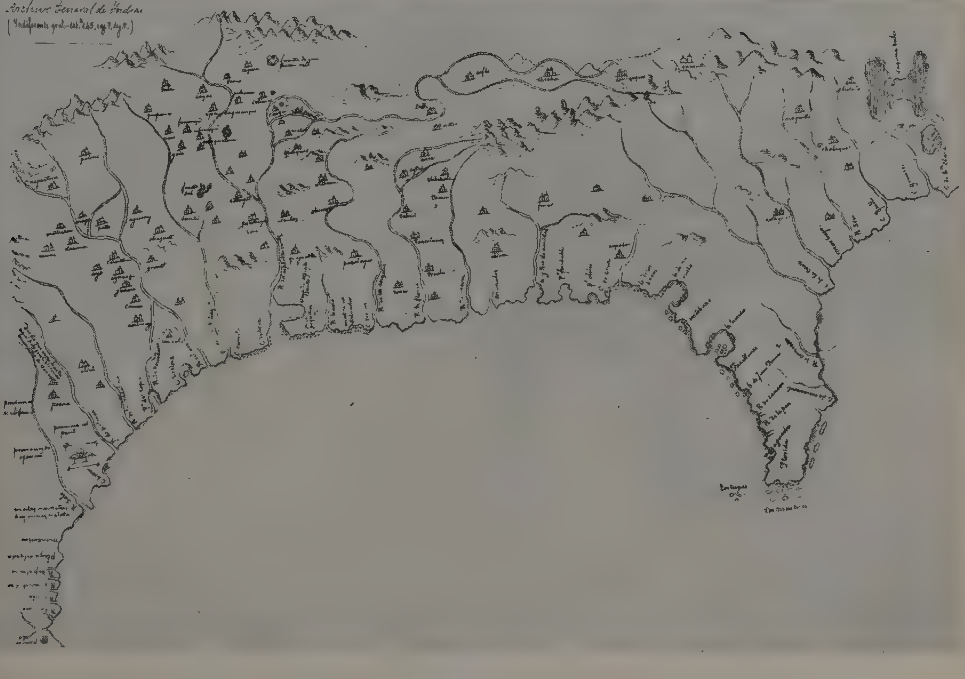
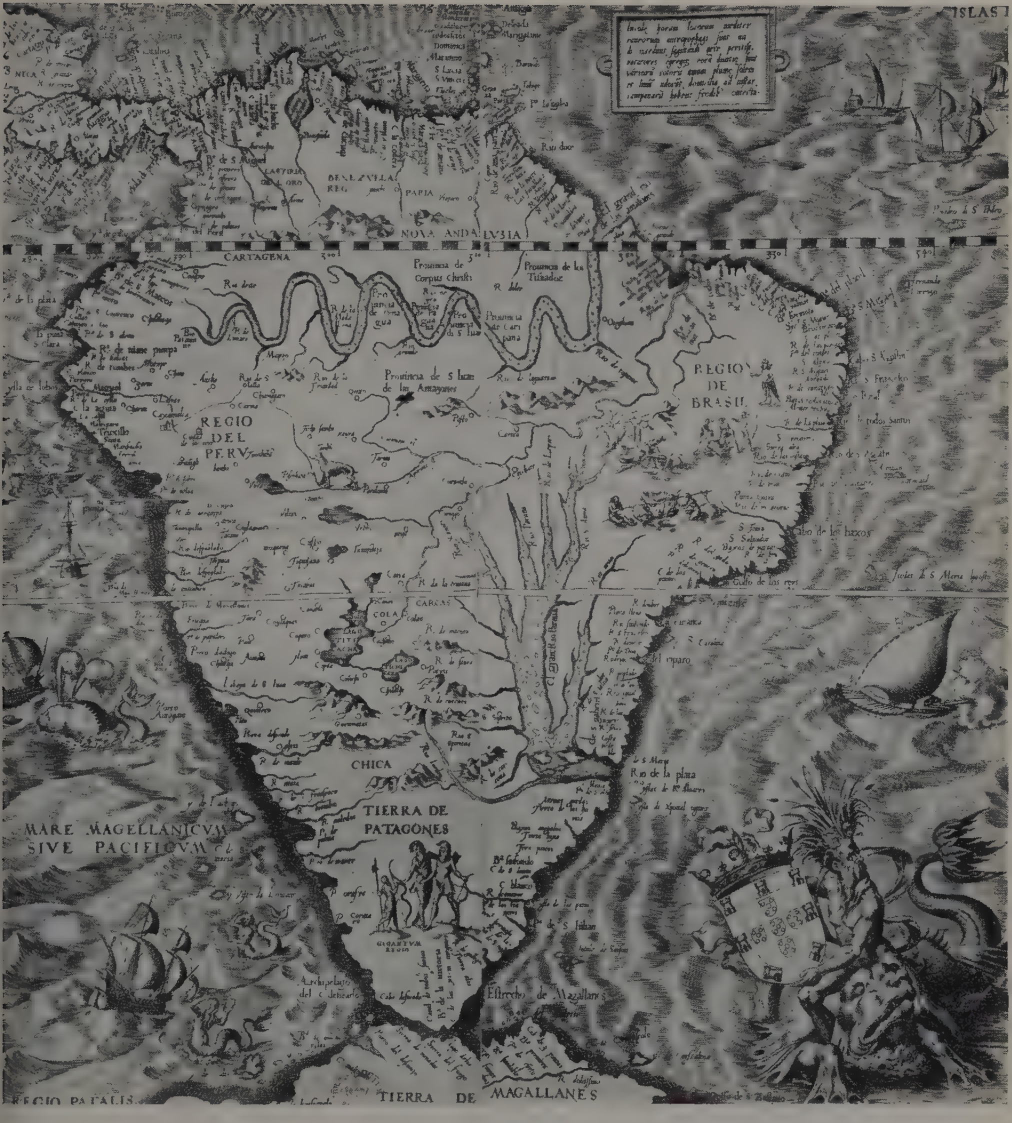


Nova Scotia and Newfoundland, naming the mainland New France. The voyages by which Verrazano "established the cartography of the north-east coast of America between Florida and Cape Breton, including the Hudson River" are recorded on a world chart by his brother Girolamo (Fig. 3). Here, and on other maps of the "Verrazanian" type, we see, to the south of Norumbega (the New England region), a conspicuous "little necke of lande in 40 degrees of latitude" dividing the Atlantic from the Sea (or Gulf) of Verrazano, which (could it be doubted?) "bathed the limits of India, China, and Cathay". This neck of sand ("arena") was in fact the Hatteras sandspit, and what Verrazano saw across it in 1524 was no ocean but the waters of Pamlico Sound; yet over half a century later his "colossal error", perpetuated by the cartographers, was to sustain the projects of Hakluyt and Raleigh for English exploration and settlement in this region (Fig. 4).

By 1529, as Girolamo da Verrazano's map shows, the Atlantic coastline of North America had been traced in detail from Florida to Nova Scotia and Cape Breton, and its principal indentations between Chesapeake Bay and the Bay of Fundy placed on the charts. This coast was, it is true, shown as trending E.N.E.-W.S.W. (instead of N.N.E.-S.S.W.). The 16th-century chart was laid down from compass bearings and drawn for the use of pilots sailing on compass courses; its meridians therefore indicated magnetic and not true north. The westerly magnetic variation, which prevailed along the American shores of the Atlantic and for which seamen familiar with the easterly variation of European waters were unprepared, resulted in the incorrect orientation given to the North American coast by early cartographers (Figs. 2-4, 8). This explains too why the American landfalls of pilots "running down the latitude" on a westerly course were commonly plotted too far north.

North of Cape Breton a deep sound represented the Gulf of St Lawrence, and Newfoundland was connected to Labrador, for the Strait of Belle-Isle had not yet been navigated from east to west; on many later maps Newfoundland was drawn as an archipelago (Figs. 2, 4, 6). In this region there remained hope of a passage, and here the French resumed the initiative which they had taken with Verrazano's expeditions. In 1534 Jacques Cartier, a sea-captain of St Malo, "made his first discouerie", as an Elizabethan propagandist wrote, "of those partes of America, which lie . . . as it were on the backe-side of Newfoundland. In which voyage his principall intention was to seeke out the passage, which hee presumed might have beene found out into the East Indian Sea, otherwise called the passage to Cathaya". On this voyage Cartier sailed through the Strait of Belle-Isle, along the west coast of Newfoundland, and into the mouth of the St Lawrence. The Indians whom he brought back to France told of three Indian "kingdoms", those of Canada or Stadacona, Saguenay, and Hochelaga, and described the St Lawrence as "the great river of Hochelaga and the route towards Canada". Encouraged by this report to hope for a strait or river communicating with eastern Asia or for wealthy native kingdoms like Mexico, Cartier in 1535 sailed up the St Lawrence past the Saguenay river to the Indian settlement of Stadacona (Quebec) and went on by boat to Hochelaga (Montreal; Fig. 7). A third expedition, under Roberval and Cartier, was sent out in 1542 to colonize "the lands of Canada and Hochelaga, forming the limit of Asia by way of the west", but did not extend Cartier's earlier discoveries. On this voyage Jean Alphonse, Roberval's pilot, compiled sailing directions (printed by Hakluyt) and rough charts for the "River of Canada". Cartier's own maps have not been preserved, but his discoveries were promptly laid down in contemporary charts by Dieppe hydrographers (Fig. 6).

The conquests of Mexico (1519-21) and of Peru (1531-33) provided the Spaniards with bases for the exploration of Central America and the continental lands to the north and south. Before the fall of Mexico the outline of the Gulf of Mexico had been taking shape on the maps (Fig. 8). Florida had been discovered in 1513 and Yucatan in 1518-19, both peninsulas being first charted as islands; and in 1519 the whole northern shore of the Gulf, from Florida to the Rio Panuco, was coasted by Alonso de Pineda in search of a western strait. Soon after the conquest, Spanish overland expeditions from Mexico had reached the Pacific in the west and Panama to the south-east; and in 1533 a fleet sent out by Cortes discovered California. Although the Gulf of California was navigated to its head in 1540 and contemporary charts correctly delineated the peninsula (Fig. 9), California became the victim of a curious retrogression in cartography. Described on an English map of 1625 as "sometymes supposed to be a part of y^e westerne continent, but scince by a Spanish Charte . . . it is found to be a goodly Islande", it continued to be laid down as an island throughout the 17th century. The territory to the



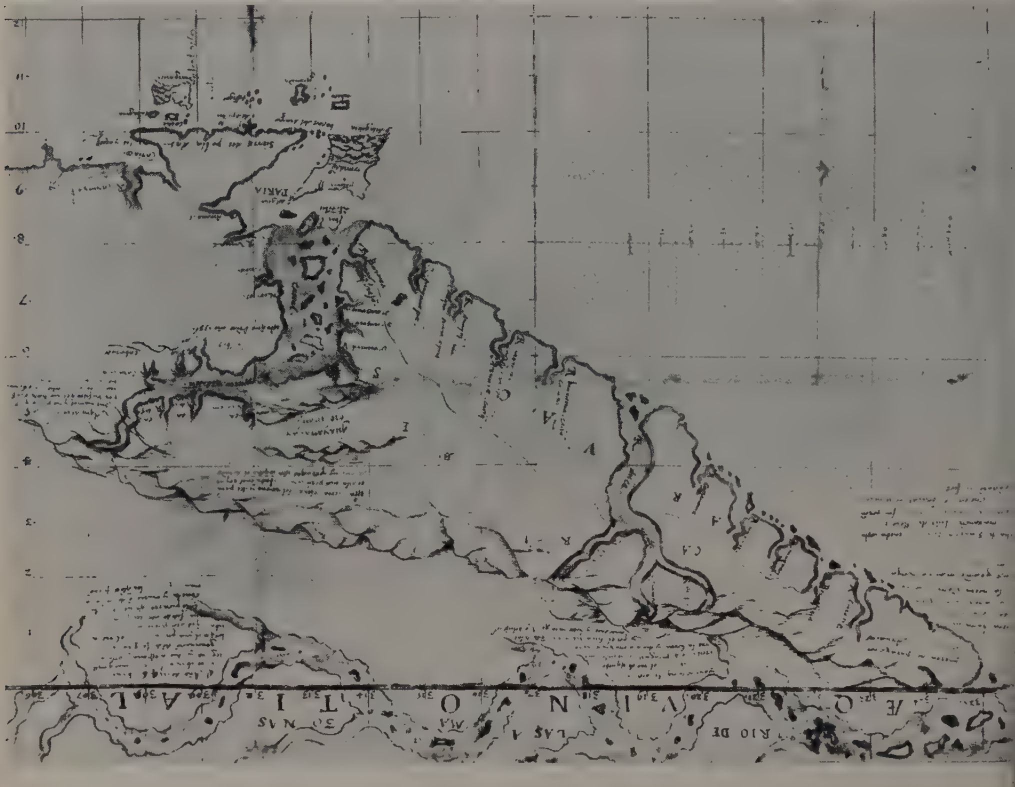
(Fig. 11) South America, from a map by Diego Gutierrez, cosmographer in the Casa de la Contratación, engraved at Antwerp in 1562. This shows the extent of Spanish exploration along the coasts and river-valleys, and inland from Peru and from settlements on the north coast and in the River Plate basin. The Amazon, revealed by Orellana in 1540-41, is in the serpentine form common to all early maps; the Plate estuary is grossly exaggerated; and the names on the wrongly oriented Pacific littoral indicate Spanish navigation along that coast

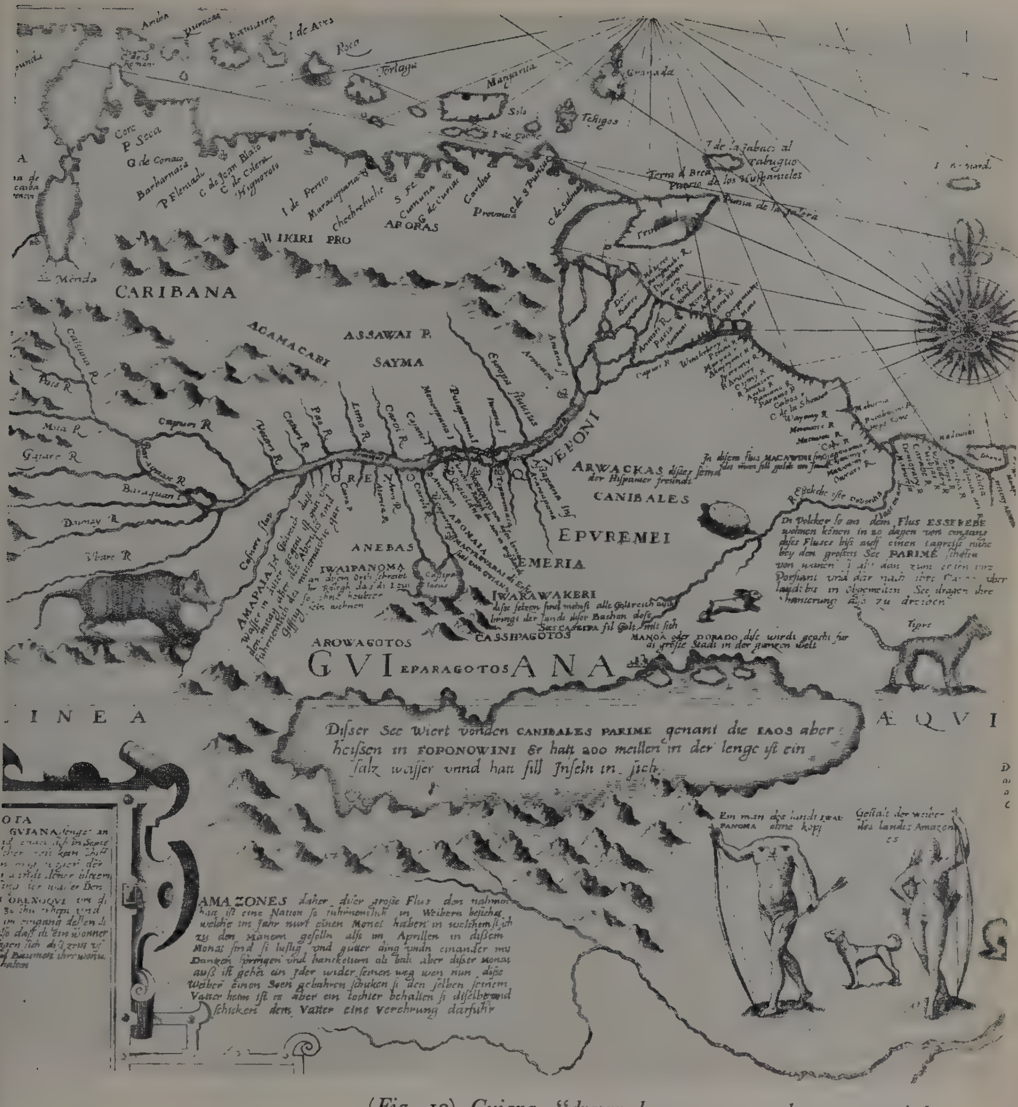
north of the Gulf of Mexico was explored by two grandiose Spanish expeditions from Florida, impressive alike for their tenacity and for the magnitude of their failure. Of the first, which set out in 1528, only four survivors led by Cabeza de Vaca lived to bring to the Spaniards in Mexico, in 1536, their tale of the "Seven Cities of Cibola". Three years later Hernando de Soto led an expedition into the Mississippi valley; the survivors, after traversing "over 350,000 square miles of unexplored North America", at length reached Tampico, on the Gulf, in 1543. These journeys, with others from the Pacific coast, placed on the maps the fringe of the vast interior of the North American continent (Fig. 10).

From Peru, Spanish expeditions by land thrust south into Chile in 1535, north into Colombia in 1539, and east into the Amazon basin. The course of the Amazon, from its headwaters to its mouth, was followed by Francisco de Orellana in 1540-41, and that of the Orinoco by Lope de Aguirre in 1561 (Fig. 12). To Guiana, adventurers were drawn by the tale of El Dorado, the gilded King of the legendary city of Manoa, first reported to the Spaniards about 1530. In the second half of the 16th century numerous expeditions, culminating in that of Antonio de Berrio in 1590-91, sought El Dorado in the highlands of Guiana; and thither in 1595 Sir Walter Raleigh led an expedition to win "a better Indies for her Maiestie then the King of Spaine hath any". After sailing up the Orinoco to the mouth of the Caroni river, Raleigh returned with eloquent accounts of gold, of monsters, and of "that mighty, rich, and beautifull Empier of Guiana, and of that great and golden Citie, which the Spaniards call El Dorado, and the naturals Manoa". In 1596 Laurence Keymis, sent out again by Raleigh, brought back news

(Fig. 12) A Spanish map of the rivers Orinoco and Amazon ("Rio de las Amazonas"), drawn about 1555 and recording their exploration to this date. The Amazon retains its serpentine course, as in Fig. 11; the estuary of the Orinoco is depicted, but its headwaters were still unknown

By courtesy of the Real Academia des la Historia, Madrid

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ARWACKAS diser der Hispanier freunde
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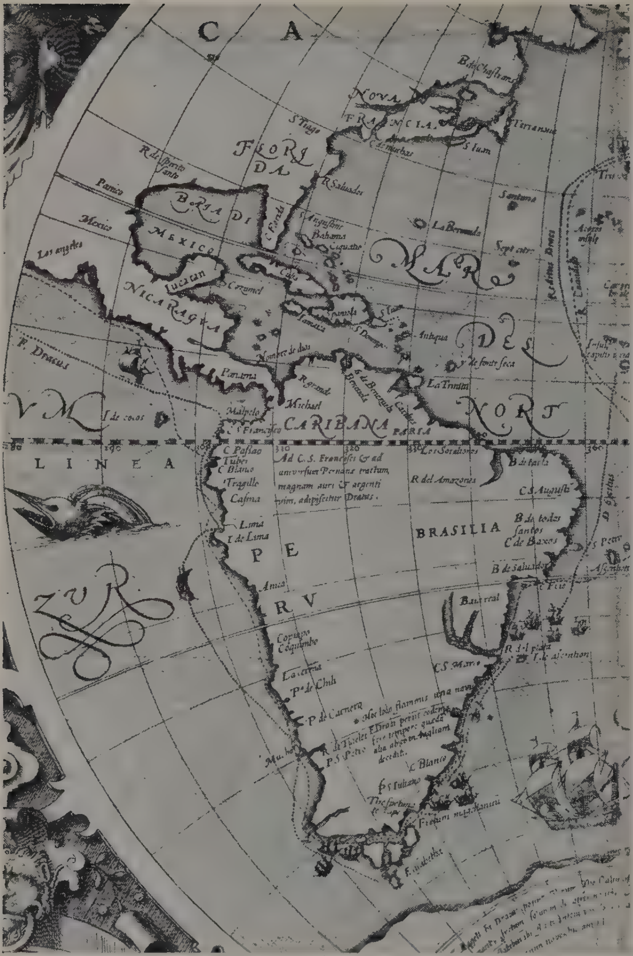
Ein man des lands EWAIPANOMA ohne kopf
Gestalt der weiber des landes Amazones

(Fig. 13) Guiana, "drawn by a seaman who accompanied Walter Raleigh on his voyage (of 1595)", and engraved by T. de Bry in 1599. To the south of the Orinoco lies the salt lake "called by the cannibals Parime" and reported by Keymis in 1596; on its north shore stands "Manoa or Dorado, the greatest city in the world". These features may be derived from Raleigh's own map. At the foot are pictures of an Amazon and a man of the Ewaipanoma, a tribe reputed to have their heads in their chests. A legend relates that Amazons live with men only in April—a story that goes back to Marco Polo



(Fig. 14) South America, from a world map engraved by Hondius about 1590 with the tracks of the circumnavigations of Drake (1577-80) and Cavendish (1586-88). Drake's correction to the charting of the Chilean coast (cf. Fig. 11) will be noted

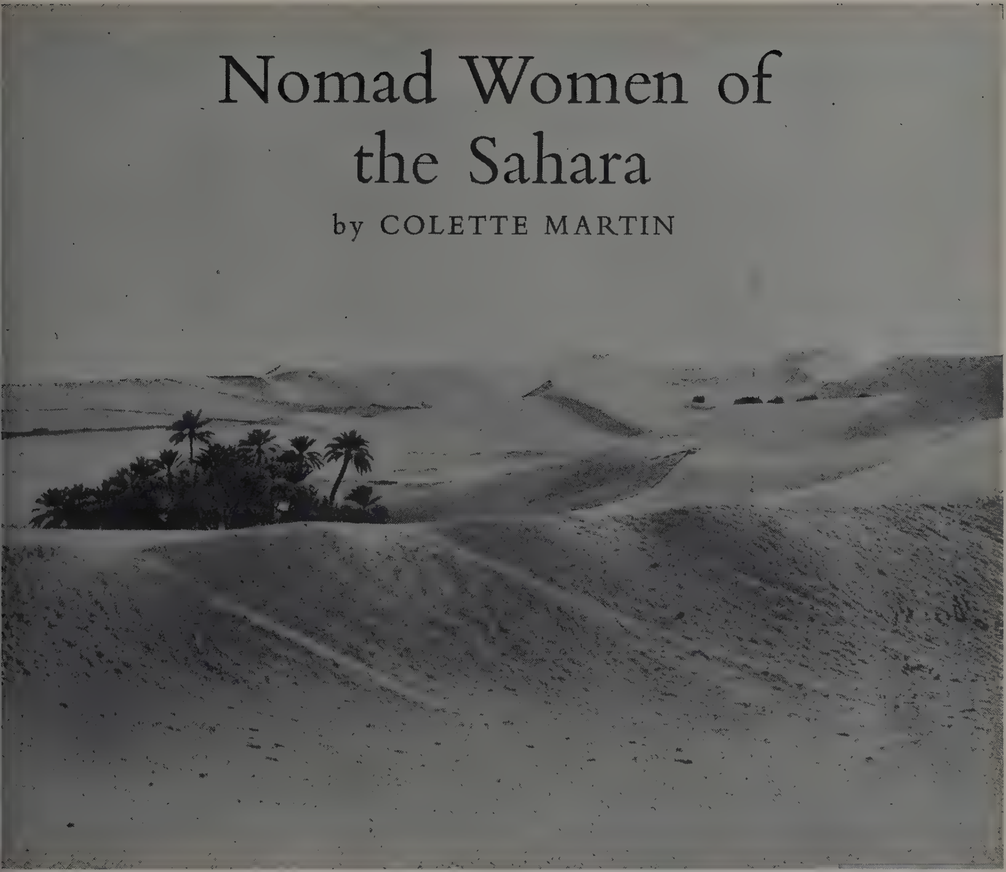
of "a Sea of salt water, named Parime", lying "farre within" on the route to Manoa. These and other features of the real or conjectural geography of Guiana were laid down "in a large Chart or Map, which", Raleigh wrote in 1595, "I haue not yet finished" and which has been identified with a manuscript map in the British Museum; other maps were engraved from material furnished by seamen who had been on Raleigh's voyages (Fig. 13).

The third great river estuary, that of the River Plate, discovered by Vespucci in 1502, visited by Magellan in 1519, and explored by Sebastian Cabot in 1526-29, was settled between 1537 and 1580. Inland the city of Potosí, in Bolivia, said to be the largest city of the New World in the 16th century, sprang up near its silver mines discovered in 1545. By the middle of the century Spanish seamen had navigated almost the entire coasts of South America (Fig. 11). A ship from Spain made her way in 1539-41 through the Magellan Strait and north along the Chilean coast to Callao in Peru, but not until 1553 was the voyage made in the reverse direction. In October 1578, on his voyage of circumnavigation, Drake noted an error in the Spanish charting of this coast: "We ran, supposing the coast of Chili to lie as the generall Maps haue described it, namely Northwest, which we found to lie and trend to the Northeast and Eastwards, whereby it appeareth that this part of Chili hath not bene truely hitherto discouered, or at the least not truely reported for the space of 12 degrees at the least" (Fig. 14).

During the 16th century European enterprise in the exploration and colonization of the Americas had been seaborne. The bases in which Spanish, French and English adventurers had established themselves lay for the most part along the coasts or on river estuaries, and they were supplied by oceanic lines of communication. In cartography the characteristic form was the sea chart. To the next two centuries fell the task of extending the landward frontiers of knowledge by exploration, mapping, trade and plantation. In South America the leading pioneers were Jesuit missionaries. In North America, French settlers in the St Lawrence basin, English colonists of the Atlantic seaboard and furtraders in the North-West, and the Spaniards of New Mexico were to open up the continent from ocean to ocean.

Nomad Women of the Sahara

by COLETTE MARTIN



All photographs by the author

A palm-grove in the luminous emptiness of the Sahara: the next village is three weeks' march away

THE wives of the nomads of the Sahara Desert are among the least-known women in the world. Despite modern means of transport there are still immense regions of the great Sahara that are difficult of access, away from roads and tracks. Many hundreds of miles separate one group of dwellings from another and yet, according to the needs of each season, there is a continual coming and going between them. The nomadic and semi-nomadic tribe of the Chambaa are great connoisseurs of riding-camels; their domain extends from the foot of the Atlas Mountains to the frontiers of Mauretania.

Eternal travellers, they cross the desert in every direction with their flocks of sheep, goats, chickens, pigeons, dogs and camels. Their tents of goats' hair, their blankets and cooking pots are all piled on to the backs of the precious camels. The women and children follow, very often on foot. It is difficult to say how many miles a woman of the Chambaa tribe travels in her lifetime. I have certainly never seen a fat woman among them, and their diet is to be recommended for preserving the figure: a handful of dried dates, three glasses of tea, cereals occasionally, and meat only very rarely. It is difficult to understand how human beings can live on so little food without their health being affected in some way. The total lack of hygiene makes the infant mortality rate very high. In this way Nature eliminates those that are too weak for the hard life of a nomad. The eyes suffer most of all, due to a shortage of vegetables, as well as to the smoke in their

(Above) *A nomad encampment in the Sahara. When these are established near a palm-grove a protective fence of palm-leaves is generally erected around the tent, against the wind and sand. The camp comes to life on the approach of a stranger and the children run to greet the newcomer.* (Left) *Camels are the most precious possessions of the nomads of the desert. One knee is tied, when they have been watered, to prevent them wandering too far but even so they are able to find for themselves the minute plants growing in the sand which form their scant sustenance.*

tents, and above all to the powerful glare of the African sun and its reflection on the sand.

Very often, out on the desert tracks, I found myself suddenly, on rounding a high sand-dune, in the middle of a nomad encampment. There had been nothing to betray its presence: no noise, no singing, not a trace of it anywhere. It is true that my European eyes were unable to read the signs in the sand.

Putting on my brightest smile I would approach. As always, the children were to the fore, crowding around me, staring at the strangely dressed woman with the blue eyes. The sign-language began. No-one spoke French, but we understood each other all the same. The women, no longer able to restrain their curiosity, came timidly forward and crouched down a few yards away. I sat near them, on the softest yet hottest armchair in the world, the beautifully fine and yellow-ochred sand of the Sahara. I looked at and touched their clothes which are mostly dark and bordered with two brilliantly coloured stripes. They are nearly always of European material, except for an over-garment made of wool and woven by hand, a large piece of material that serves them both as a cloak and a blanket for the night. The women use a charming gesture when draping it around themselves. Their jewellery is usually of copper or often of silver, but gold jewellery is too expensive for them. With strands of wool of striking colours they adorn themselves with a kind of necklace ornamented with big round pom-poms which give a very pleasing effect. They also wear very large ear-rings (I have seen them as much as five inches in diameter) hanging from each ear and shining like the sun. Sometimes the weight is taken by a strand of wool over the head. Their faces are often very beautiful, and quickened by that directness of expression given to all those who live close to Nature.

We got to know each other. I too was examined closely and no detail of my equipment escaped them. My nail-varnish, being so brilliant, was the thing that interested them most. My sandals were passed from hand to hand, and the women knew at once that I had got them from the Touaregs. A finger immediately explained to me, drawing with light gestures in the sand, that they were made from buffalo skin.

So here was a universal method of conversation: drawing. For hours we drew in the sand and I learned many things. Drawing from right to left with the index finger and the ring finger they told me by signs all the details of their simple existence, showing first of all the camel, then the scorpion, the horned viper, a hen, a sheep, a palm tree, household utensils, the moon and the stars: everything was extremely stylized in a few strokes.

Water is an enormous problem for them. Each drop is indispensable. No European can imagine or even dream of the value of one pint of water in the Sahara. The rare wells, where brackish water collects, are the stopping-places at which the nomads camp. To give water to the camels is the work of the women. The wells are always very deep, varying from forty-five to as much as nine hundred feet, according to the locality. They spend hours drawing up the water by rope and bucket, since to slake the thirst of each camel takes 125 pints! Not that the camel likes to drink this much water: they force him to drink it. They make him lie down and force-feed him with bucket after bucket of water necessary for his existence. Then, with one of his legs folded and tied at the knee to prevent him roaming too far away, they leave him to look around by himself for what poor nourishment the desert affords.

In the Sahara the time of day has no importance. Breakfast, dinner and supper are terms without meaning. Time is measured by the sun, and meals are taken according to the possibilities that present themselves. I had some sugar and tea in my pocket, and entered their tent (*zeriba*). In no time at all they lit a small fire, sacrificing a bit of wood and some dried roots pulled out of the sand. The blue enamel kettle ("Made in England") was soon sending out jets of steam. The sugar, highly appreciated, was parsimoniously distributed. They smiled: we understand each other. Today we shall not be hungry, they seemed to say.

The tents of the nomads are quickly erected. Some stakes are driven into the ground, over which is placed a dark brown covering of woven goat-hair. Sometimes, if there is a palm-grove nearby, the women make a sort of circular forecourt which is surrounded by a hedge of interlaced palm leaves. This protects them a little against the wind and sand which, when it starts to blow, will cover in a few seconds everyone and everything in the tent. Everything you touch in the Sahara is filled with sand, to say nothing of everything you eat. It always grates on the teeth, but you get used to it.

They set out the primitive crockery on the sand and with graceful movements embed the glasses of hot tea in it; there must be no risk of their falling over. They sit in a squatting position, very still, while they eat, as any

The life of the nomads may be hard but, to judge by the faces of this shy mother and her baby, it is a healthy one for those that survive the rigorous and unhygienic conditions in the Sahara

movement covers tea, glasses and fire with sand. I cannot imagine our rowdy children in a nomad's tent. It would be disastrous.

I softly hummed a tune so that the women would understand that I should like to hear them sing, and quickly the tom-toms, always near at hand, started to beat. Their slow chants are rhythmical with very little modulation. Only their cheerful or dreamy looks told me whether the song was gay or sad. I felt I would like to know their language in order to understand their poems, for they are said to be very beautiful. Yet I was content to listen and look, to let myself be carried away; I started to dream.

The sharp report of a gun suddenly made me start, then two more shots, then a dozen. What on earth was going on? I looked at the women's faces. They laughed and made me understand that a marriage was about to take place. This was a piece of real luck.

We went out and walked as quickly as we could over the difficult ground towards a high dune which we rounded to find another nomad encampment. The gunshots suddenly stopped and I was taken first into the forecourt and then the tent.

I was assailed by a crowd of women dressed in their most beautiful clothes. They had done themselves proud. The gunshots, the tom-toms and the clapping of hands began again. They certainly knew how to enjoy themselves in the zeriba.

But where is the bride, I wondered? Completely enveloped in a large piece of white material, she was sitting on the sand. The poor little thing was literally crushed by all her female friends, relatives and guests, pressing around her. I wondered how she could still breathe in all the sand that was being stirred up.

I went up to her and thought she could see me in spite of her thick veil. I smiled at her and took her hand, thinking that though I could not see her face I might be able to guess her age by the feel of it.

The arm and hand that came out from beneath all her clothes were strongly dyed with henna. It was not a very young hand. I could see the edge of a dress of an apple-green artificial satin, and then a foot also dyed deep red. I thought I saw a very black eye burning behind her veil.

A young girl-friend of the bride's, with a Biblical face like that of a Mary Magdalene, knew a little French because she had spent a year with the nuns, so I asked her if the Chambaa women have special dances to celebrate a marriage. "Of course," she said, "and you shall soon see them." This spectacle was to take place outside as it needed room, and the men had permission to take part.

First of all they did what is called the "Dance of the Hair". There was no music, except for the tom-toms. With heads uncovered, their long hair flowing in the wind, five women advanced on their knees with eyes closed. Only the head moved in this strange sacred dance. It was a slow, stiff, circular

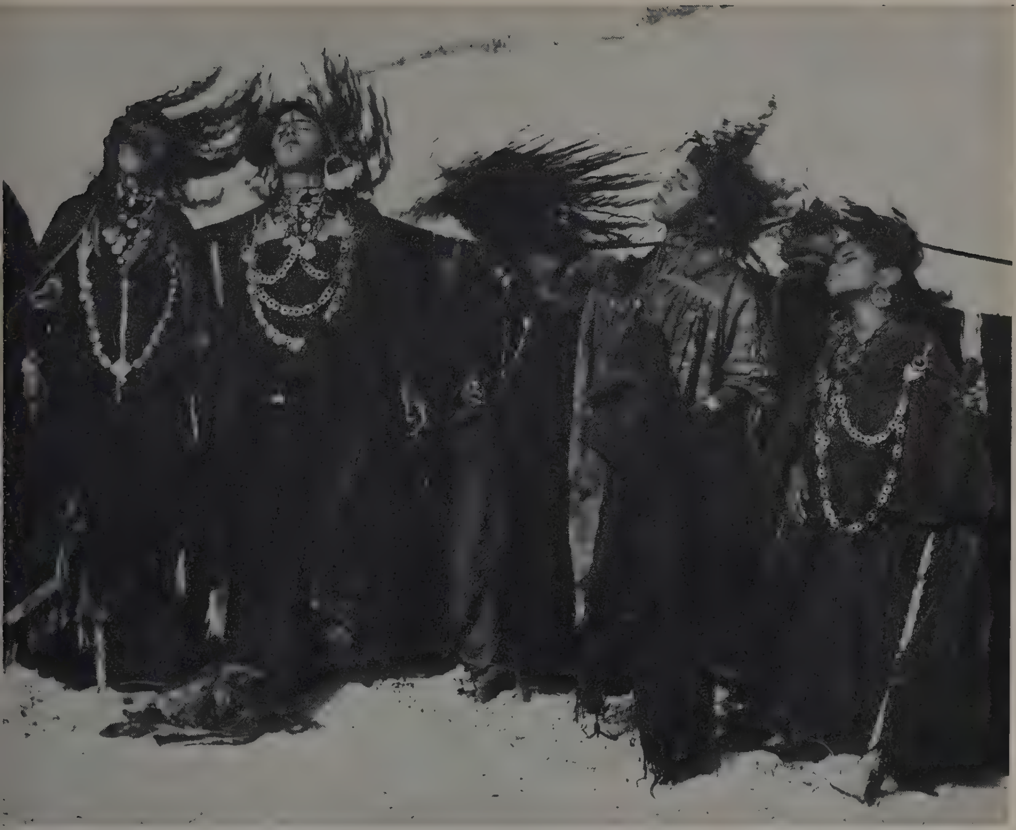
Drawing in the sand proved a simple method of communication between the author and her hosts in the encampment. Quick, stylized designs told her all about their customs and their way of living

movement. Their heads swayed from back to front, then from side to side, then forward, turning all the time, making their long hair fly out in all directions like flames. It was hypnotic. I do not think I could do it five times without becoming giddy and losing my balance.

At a given moment a spectator approached one of the dancers and poured the contents of a small bottle of scent onto her head. It was an offer of marriage. I am sure she did not know what had happened, caught in the ecstasy of the strange dance. It was not long before she fell fainting onto the sand and was carried feet first into the tent, to be replaced in the dance by another woman. Finally, all the dancers fell as if wounded, helpless, to the ground. A little water was sprinkled on their faces and they got up dizzily, replacing their heavy veils and returning, as if nothing had happened, to the bride.

How their hearts must have pounded! I was distressed to see their fatigue, but the young woman who knew some French said that in an hour's time they would be ready to start again. The marriage celebrations

A nomad girl, a lonely figure in the expanse of sand, drawing water from one of the rare brackish wells. This is a woman's task and by no means an easy one since the wells are always very deep



The exhausting "Dance of the Hair", part of the marriage celebrations of the Saharan nomads, in which slow, stiff head-movements make the performers' hair "fly out in all directions like flames"

would last six days, and it would not do to be tired yet.

The men danced also, but without doing themselves as much damage as the women. They did warrior dances, a sort of stamping accompanied by gunshots.

Darkness came quickly. The sky ranged the whole spectrum from yellow to violet, cut through with enormous stripes of light green. Sunsets in the Sahara are unique in the violence of their colours. One would exclaim at their improbability in a painting: they have to be seen to be believed.

I slowly guided myself across the dunes, retracing my tracks in the sand. I have an almost canine sense of direction, but I did not want to lose myself. The sand cooled down when the sun had set and I could walk barefoot. The children accompanied me for a long way. They were in no hurry to go back to their homes.

What a beautiful night it was! I could no longer hear the gunshots from the marriage feast. How vast the world is, I thought. I sat down to admire the immense celestial dome above. What stars! There was the Great Bear, the Plough; and there, less brilliant than the rest, the Pole Star. Stretching out an arm and squinting my eye I measured the direction along the tip of my thumb. Down there I would find Switzerland, my over-peopled country, where my friends are. I was a long way away . . .

Like the nomad women I scraped a hole in the sand, unrolled my coarse warm hooded cloak, and went to sleep as they do.

Tomorrow is another day, I thought, and the sun will wake me up.

Australia: Landscape Into Suburb

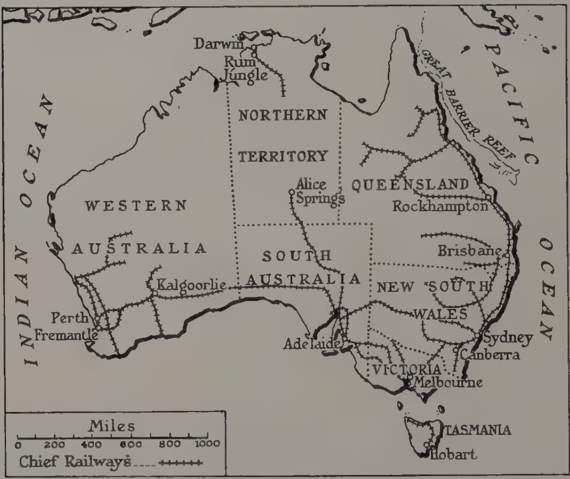
by ALAN ROSS

Mr Ross, author of three books about Mediterranean islands, is also Cricket Correspondent of the Observer. *In that capacity he visited the major Australian cities a year ago to cover the Test Matches and has described his tour in a book entitled* Australia 55, *published by Michael Joseph*

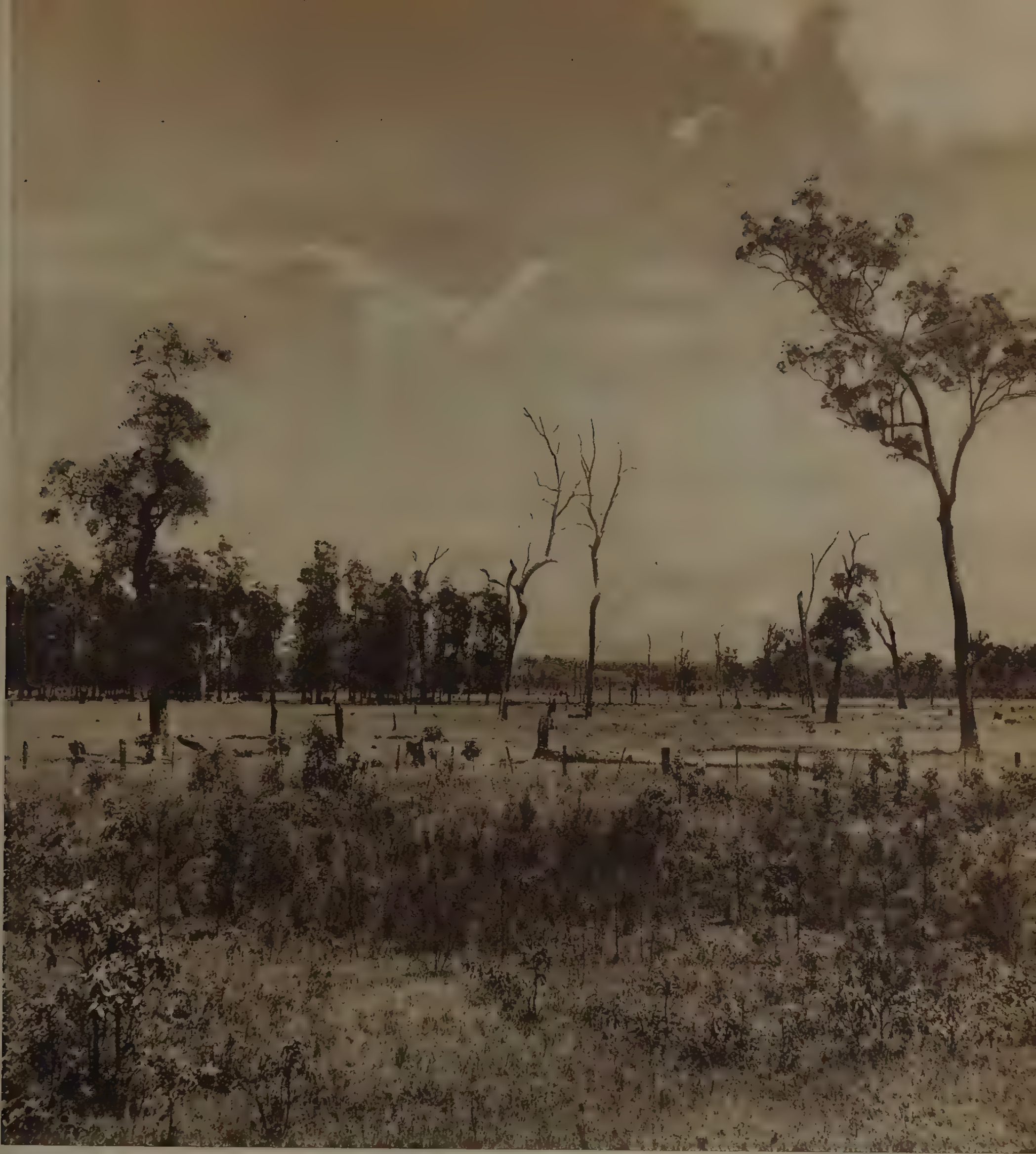
Continental Australia possesses five State capitals, each situated either on a gulf or on the shores of the open sea. The sixth division of the continent, the Northern Territory, is very thinly populated, owning only two small townships, Alice Springs in the dead centre of Australia, and Port Darwin in the extreme north, the first airstop for planes coming in from Europe and Asia, and a handy base for the uranium mines at nearby Rum Jungle.

The Northern Territory is, to this day, pioneer country, where the past of heroic cattle treks dominates the thin inroads made into it by present-day civilization. It is, as an area, necessary to the idea of Australia: but, like the Barrier Reef, it is a spectacular elaboration in the margin, rather than a part of the average Australian's experience. The concern of this article is the Australia of the majority: the expansion of city into suburb, the relationship between town and country, the character of everyday living. For the majority of Australians the city is home, "the outback" an experience. The great cattle stations, thousands of acres square, are run by a few, and by Australian standards, old families: they are in the nature of private estates, seen from the air by the travelling businessman, managed from the ground by a handful of station hands. The cattlemen and the station owners of Australia form a race apart: their lives are no longer typical. The contemporary Australian is the inhabitant of a suburb: and it is the suburb that is the clue to Australian living. In England, "suburban" is a pejorative term: in Australia it represents an ideal.

The plan of Australian cities is basically similar. The sea forms a boundary to each, and in the sea the equation of Australian happiness is finally resolved. The other boundaries to cities—as distinct from townships—are variously mountains and "bush". The bush may vary from quite thick woodland to a dusty, empty nothingness, compounded of stone and low occasional scrub; but always it implies the absence of cultivation, a negative, rather than a positive, thing, creeping up like a tide round every Australian settlement, diminishing it, and, in some obscure way, threatening rather than liberating it. D. H. Lawrence, in his remarkable, strangely neglected novel *Kangaroo*, gets to the essence of the country. "That curious sombreness of Australia, the sense of oldness, with the forms all worn down low and blunt, squat . . . the strange, as it were, *invisible* beauty of Australia, which is undeniably there, but which seems to lurk just beyond the range of our white vision. You feel you



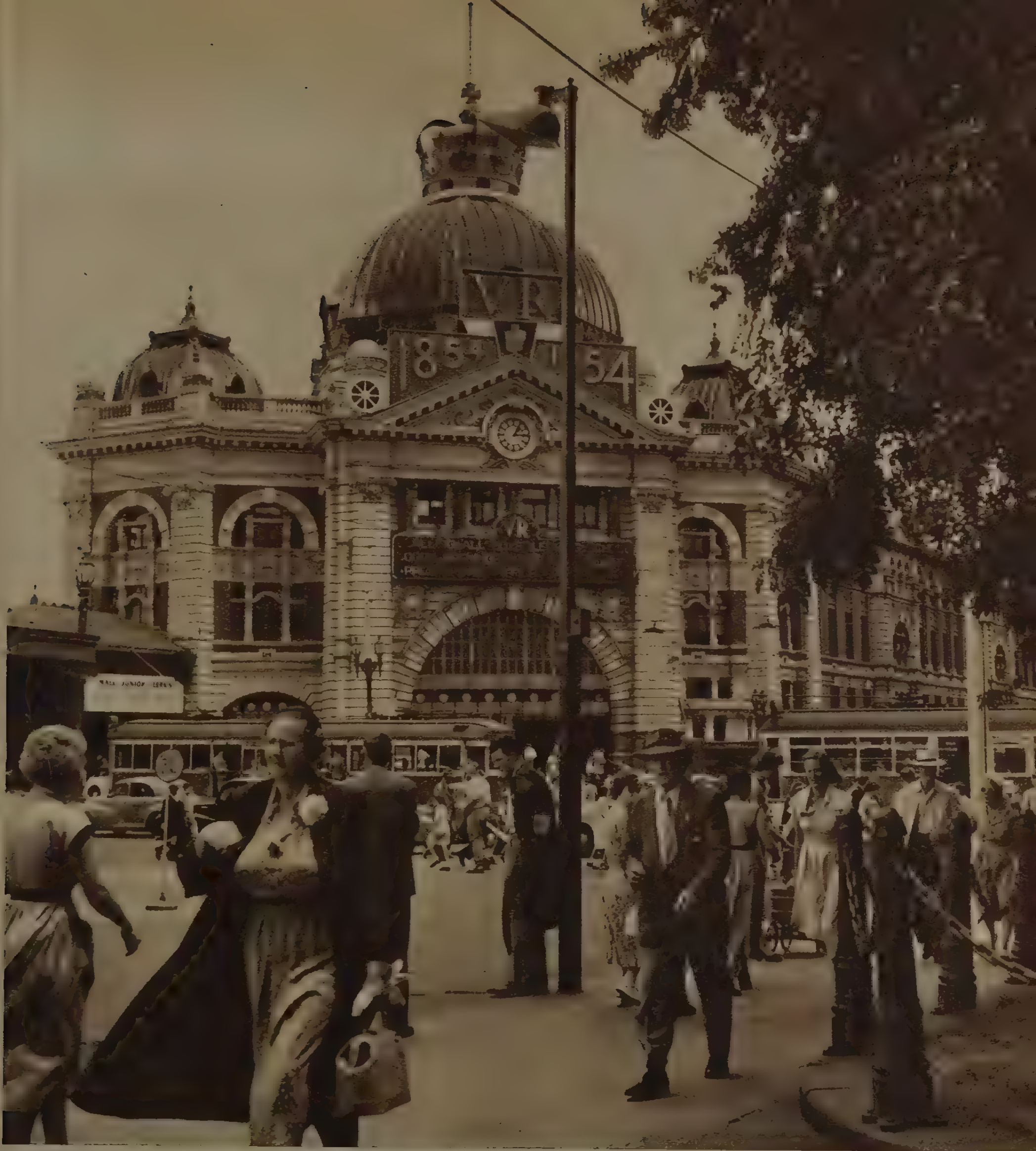
A. J. Thornton



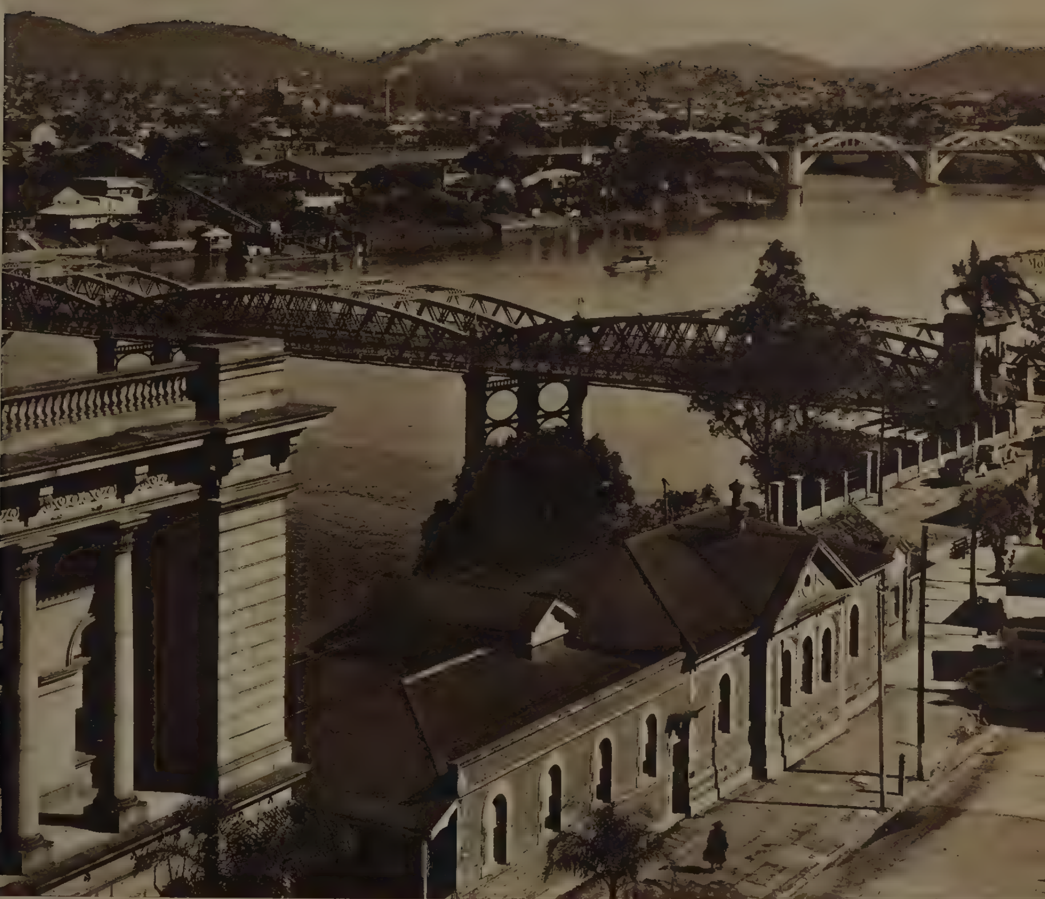
All photographs, except two, by the author

"The bush" or "the outback" occupies by far the greater part of Australia. Sometimes, as in the Nullarbor Plain between Perth and Adelaide, it is pure desert, a mixture of stones, red dust and spinifex; sometimes, as in this stretch of land near the New South Wales-Queensland border, it is cattle country, flat, dry, the hard colourless sky pierced by bare white trunks of ghost gums and other eucalypts. Occasionally, as on the outskirts of Sydney, "the bush" is really bush

Sydney rises from its harbour, a great starfish of blue water, in skyscrapers, modern blocks of flats, low villas. The tiles are usually tomato-coloured and only at night is the effect romantic. But the sea is the axis of Australian happiness, and the State capitals are all ports, whose inhabitants find their pleasure in sailing, surfing, or simply in sunning themselves on the rind of a buoyant, pounding sea

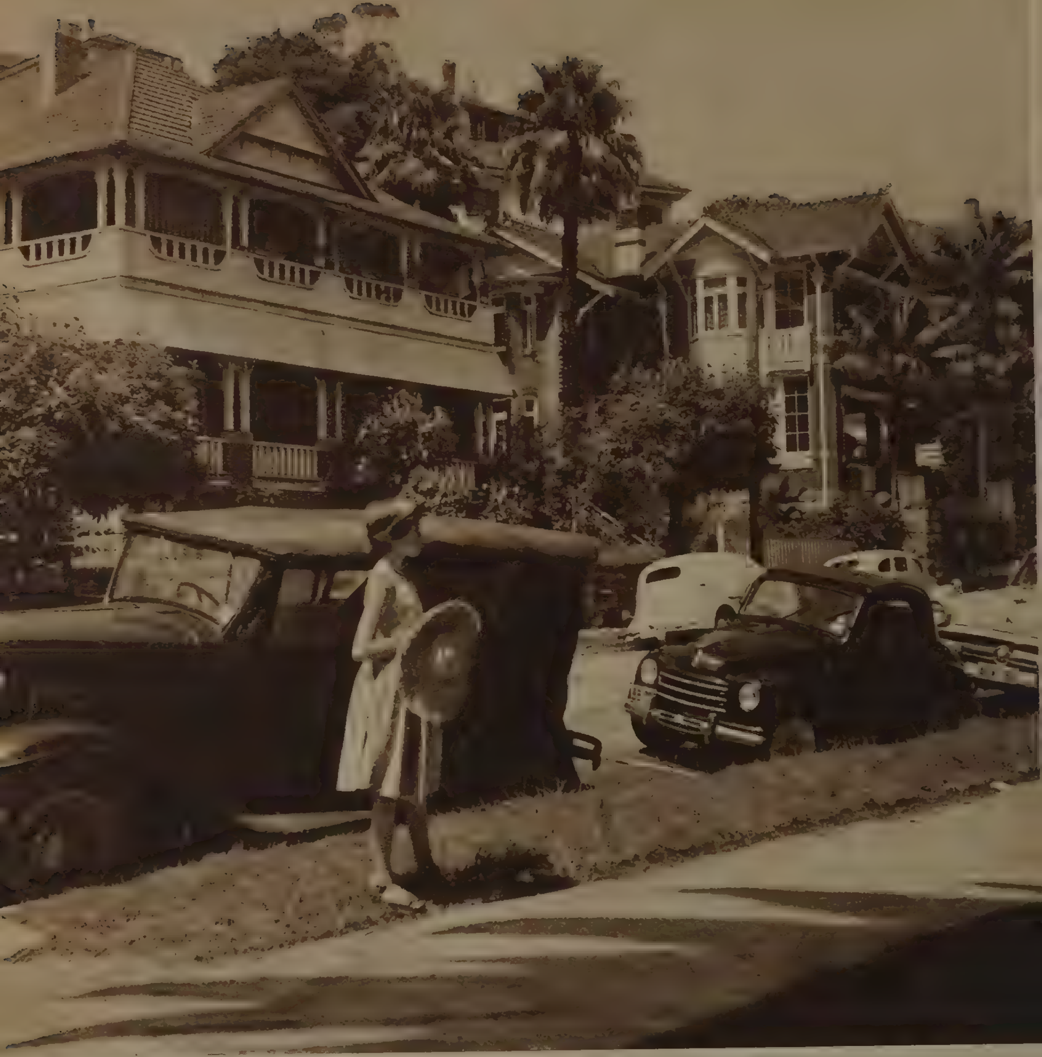


Melbourne's Flinders Street Station typifies an aspect of the ebullient and prosperous Victorian building that seems to be bouncing its way to heaven. In Melbourne, as in most Australian cities, the city centre is separated from its highly desired residential suburbs, with their neat gardens and their strict social gradations, by a moat-like river, boulevards and parks: the centre, which in Melbourne spreads off the handsome and tilting Collins Street, is for work only. All Australian cities have been developed on the grid system with four-square blocks of buildings and broad intersecting main thoroughfares

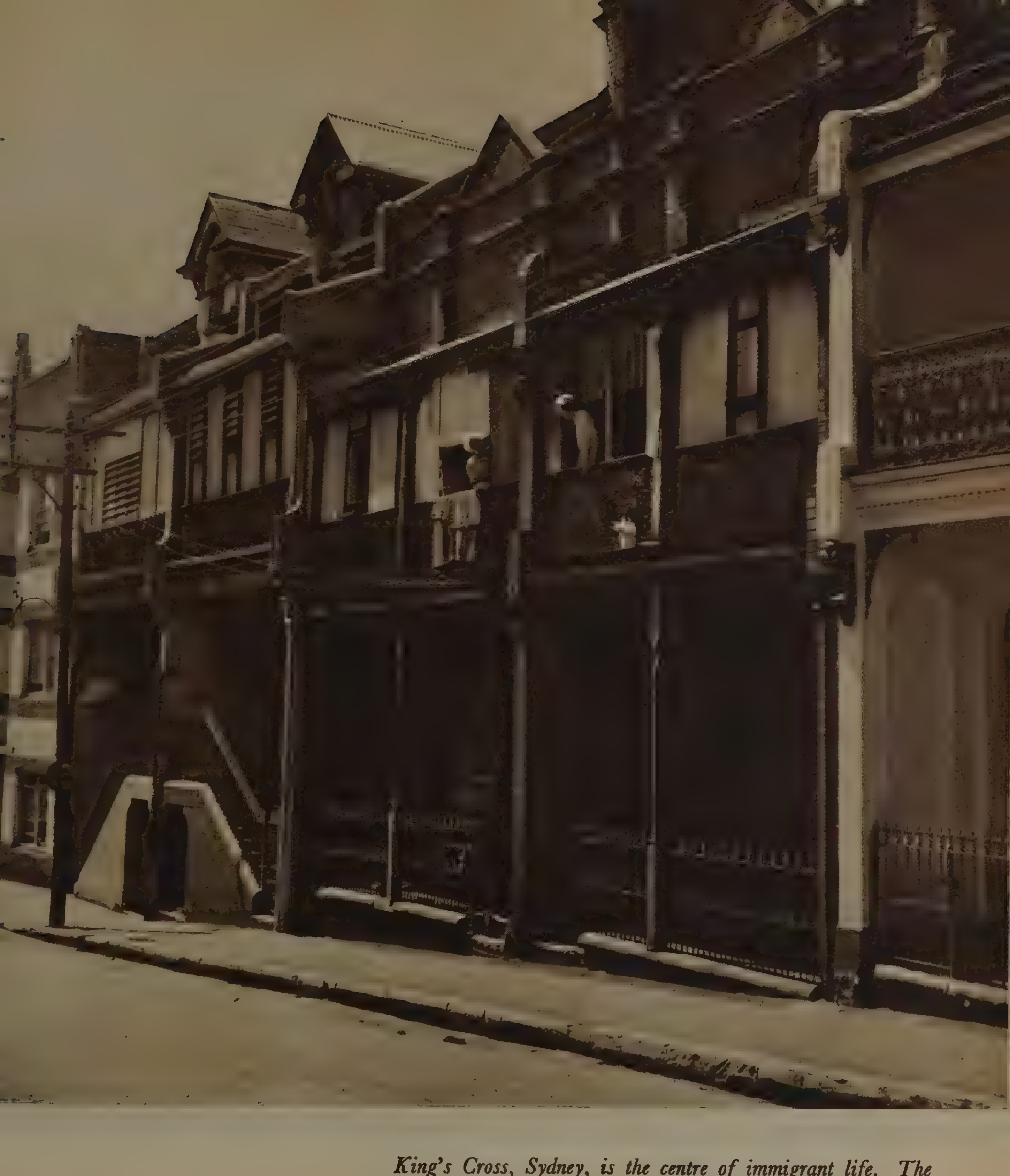


By courtesy of the Agent-General for Queensland

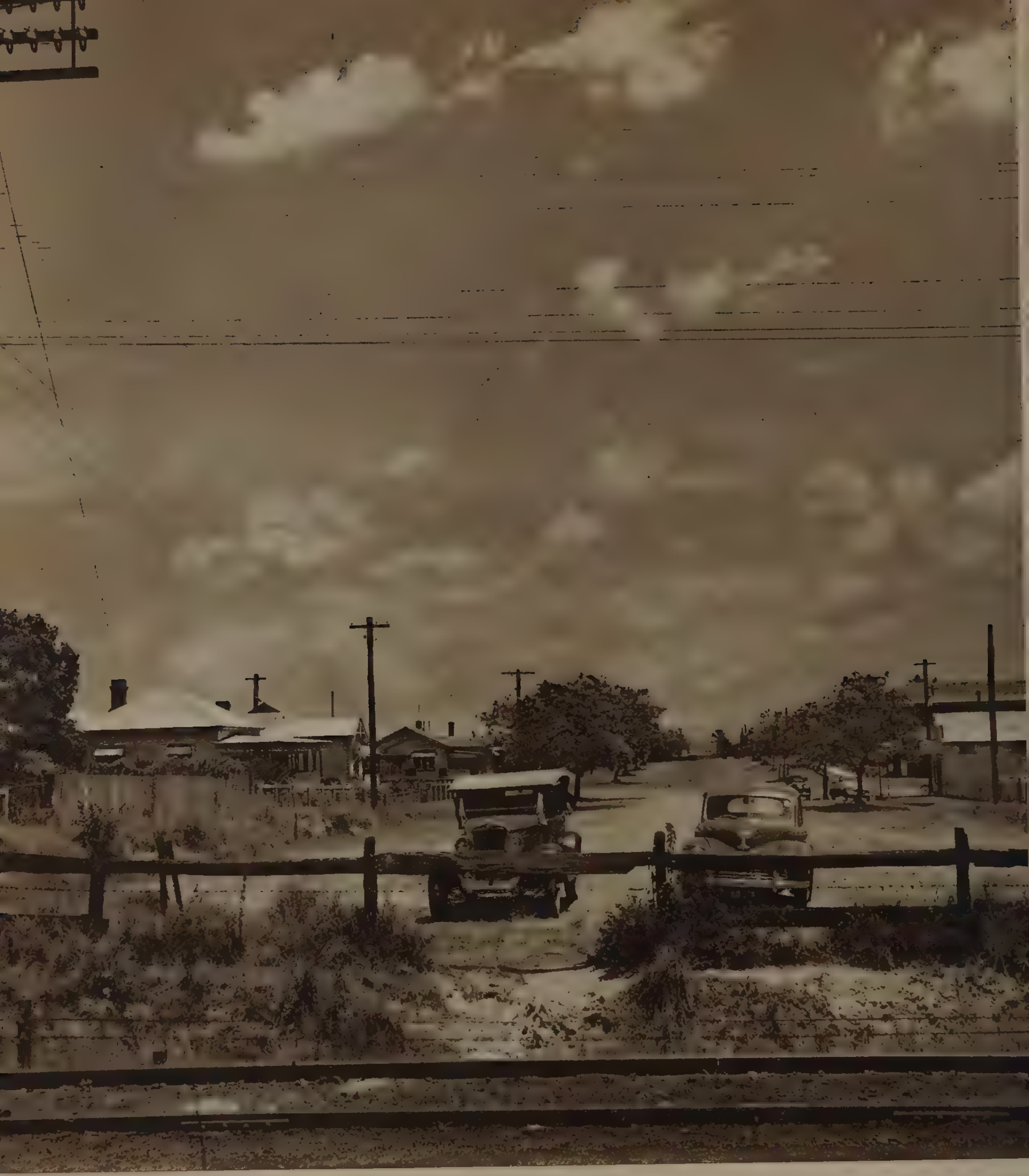
(Opposite) *The Torrens river circles Adelaide, offering its grassy banks to lunch-hour typists, and its waters to evening oarsmen. Here, before the university buildings, it has been transformed into a peaceful lake spanned by a bridge leading to the sports grounds.* (Above) *Brisbane, the most tropical Australian capital, is linked to its suburbs by a series of steel bridges. The majority of its houses are built on stilts, a style that provides a garage under the wooden floor, allows air to circulate, and keeps the white ants at bay. The Brisbane river is overhung by the shiny-leaved Moreton Bay fig, and the city streets planted with palms and scarlet Poinciana*



The southern shore of Sydney Harbour consists of numerous adjacent points and bays: Point Piper, Rushcutters Bay, Double Bay, Rose Bay, Vaucluse and so on, out to the Heads, where the Pacific breaks up on huge rocks. This street off Rushcutters Bay shows examples of the better, but not best, suburban "home", a term preferred by Australians to "house". Land values on the Sydney foreshore are astronomically high, and once the plot has been acquired there is usually little left for more than a rather simple and unpretentious building



King's Cross, Sydney, is the centre of immigrant life. The houses tend to be closely packed narrow structures, with elaborate iron lacework balconies that were brought over as ballast for the convict ships. Some, like these, are old and humble, and serve the needs of those who are also old and humble; many, however, have exceptionally pleasing and elegant proportions and, freshly painted, are taking on a new life. King's Cross, as does the rest of Sydney, stretches over steep hills to the magic blue of the harbour, with its sails and ferries



The small Australian township—this one is Casino, midway between Sydney and Brisbane—generally consists of a single main street flanked by corrugated-iron bungalows, each under a foaming mauve umbrella of Jacaranda. At either end of the street is the bush, the nothingness that reduces urban life to insignificance, and not far off passes the bumpy single-track railway that annually takes the fortunate citizen to Sydney or Brisbane for a brief glimpse of the bright lights can't *see*—as if your eyes hadn't the vision in them to correspond with the outside landscape. For the landscape is so unimpressive, like a face with little or no features, a dark face." Amid this vast, untamed landscape, Australians tend to congregate in the cities, forming pockets of resistance to the surrounding isolation.

Because Australia has room and to spare, the cities are built to allow each man his plot of land, with tiny garden, garage and dividing hedge. Despite the limitless space of Australia, these houses are nevertheless all built in neat straight rows, the road bisected at regular intervals by other neat rows. Conformity is the basic characteristic of Australian society, even more than competition, and as a result each house conforms as much to the pretensions of its neighbours as to any that its owners might possess. A "country house", in the English sense, is a rarity: so is a "town house". What everybody, regardless of income, can possess is a suburban house, a house with a wooden balcony, tomato-coloured tiles, creamy fluted pillars, and, in front of it, a sprinkler nobly doing its best to compensate for Nature by raising a blush of green to a square of bald, parched lawn. The proximity of neighbour to neighbour allows each to share in the other's fortunes and misfortunes, to affirm their mutual solidarity. This compressed style of living is not, of course, anything like so marked as in most of the older capitals of the world, but in their case it is a necessity, a cause for regret, while in Australia it appears to be an outward symbol of an inward desire to be at the same time reassured of one's normality and protected from the bush—the bush which, part though it be of every Australian's legendary inheritance, is no longer familiar to him.

For Nature, in Australia, is not a word that suggests relaxation, it does not take its place in the idea of a desirable country life, in a context such as Rousseau might have imagined it. Rather it suggests drought, bush fires, and floods, agents of deadly and perennial forces that determinedly wage war on the complacent concept that Australia is a continent of blessed ease, of unlimited time and sunshine. Comparatively, there is a fair amount of both time and sunshine: the Australian works less for more money than his counterpart in almost every other country in the world. He takes his work easily, as a man can afford to do when he can change jobs at will, purely for the sake of variety. At present, the scarcity value of the manual worker allows him an equal, if not superior, income to his more highly educated fellow-citizen, and affords him the leisure and opportunity to indulge the open-air pursuits and pastimes dear to the Australian heart—golf, tennis, racing, cricket, surfing, football. The suburb reflects this interest through its remarkable numbers of recreation grounds, courses and courts of every description. Social life is lived in the open air, on parks or beaches, on strips of lawn or harbours suitable for sailing, and the Australian city, with the possible exception of Sydney, possesses a slowness of tempo that is caused by a lack of tension. Though roads and houses for the use of immigrants are urgently needed, urgency is not a word one associates with the Australian temperament.

The immigrants may well change the shape and appearance, as they are already perceptibly changing some of the habits, of the Australian city and suburb. In the last ten years roughly 475,000 alien immigrants, in addition to 450,000 British, have settled in Australia: nearly 100,000 of them Italians and 75,000 Poles, with Dutch, Germans, Yugoslavs, Greeks and Lithuanians in that numerical order. The word "home" represented a clearly defined image to Australians in the past; we may wonder what likeness it can reflect for the New Australian as he makes his contribution to city-building in the new land.

But if the future look and atmosphere of the Australian city is a matter for conjecture, its present appearance is no less strange and variable. While British influences have naturally moulded thought and institutions, the houses in which Australians live have been conditioned by factors of climate more than respect for the home country, by suitability as much as by faith. It has not always been so, but fortunately it is so now. What remains of the Past tends to be the heavy and ornate aspects of the Victorian; little of the best building done in the Georgian manner has survived, except in Tasmania and parts of Sydney. The style loosely called "old Colonial", terrace houses with slim columns supporting their verandas, and sometimes weatherboarding above them, has largely disappeared. Australians only too late discovered the simplicity and elegance of their early buildings, and by the time they did so, the bulk of the work initiated by Verge, Lennox and Greenway had been pulled down or its proportions ruined by tasteless additions. The term "old Colonial" is in itself a misleading one, for it lumped together a number of very individual and talented architects whose common

ilms

Air views of Adelaide (above) *and Melbourne* (below) *show the layout characteristic of Australian capitals: four-square blocks of the city centre, encircling river and parks with residential suburbs beyond*

ourtesy of the Australian News and Information Bureau

characteristics were more a shared Georgian training, an eye for situation and suitable materials, than a shared style.

Today each State capital has a quite distinctive appearance and flavour, and one of the charms of travelling through Australia is this subtly defined change in atmosphere. A generalization frequently made by Australians is that the further east you go, the greater becomes the influence of America. In a superficial way, this is, of course, true: by contrast with the most westerly city, Perth, there are in Sydney more and bigger cinemas, brasher, more vigorous people, who drive bigger and faster cars. There is a greater tendency to build upward, in skyscraper fashion, than outward, which is the normal one, and many more people live in flats, a practice not common to other Australian cities. At the same time Sydney, to me, conjured up the opening-up of Australia by the British more than anywhere else. Its narrow streets, built up on the old bullock-tracks, the barracks of Hyde Park and the church of St James, both designed under the governorship of Macquarie by the West of England architect Francis Greenway, its dominating harbour with which one associates the racing wool-clippers—all these seem to me to lead one straight back to the landing in Botany Bay by Phillip, and to his rejection of it as a site in favour of Sydney Cove, where the first ambitious steps were taken in the creating of an Australian architecture. Sydney, for all its modern garishness, remains a city in which early history has, despite many subsequent mutilations, preserved its character in stone.

Adelaide, capital of South Australia, stretches between the Spencer Gulf and the Mount Lofty ranges—a neat formal town, with inhabitants who preserve a formal way of living and dressing in a climate drier and hotter than that of most Australian cities. Adelaide is a kind of compromise between the provincialness of Perth and the cosmopolitanism of Melbourne and Sydney. The pattern of commercial blocks, parks, river and suburbs is common to each, but in expanding proportions. In Melbourne the city block is bigger, the gardens more lavish, the suburbs more extensive. Melbourne also, besides possessing in Collins Street the one central street in Australia which might belong to a European capital, has several suburbs that contain houses more *avant-garde* in spirit than any to be found in England outside Hampstead. After 6 p.m. life in central Melbourne no longer exists: in suburbs like Toorak or South Yarra it is just beginning.

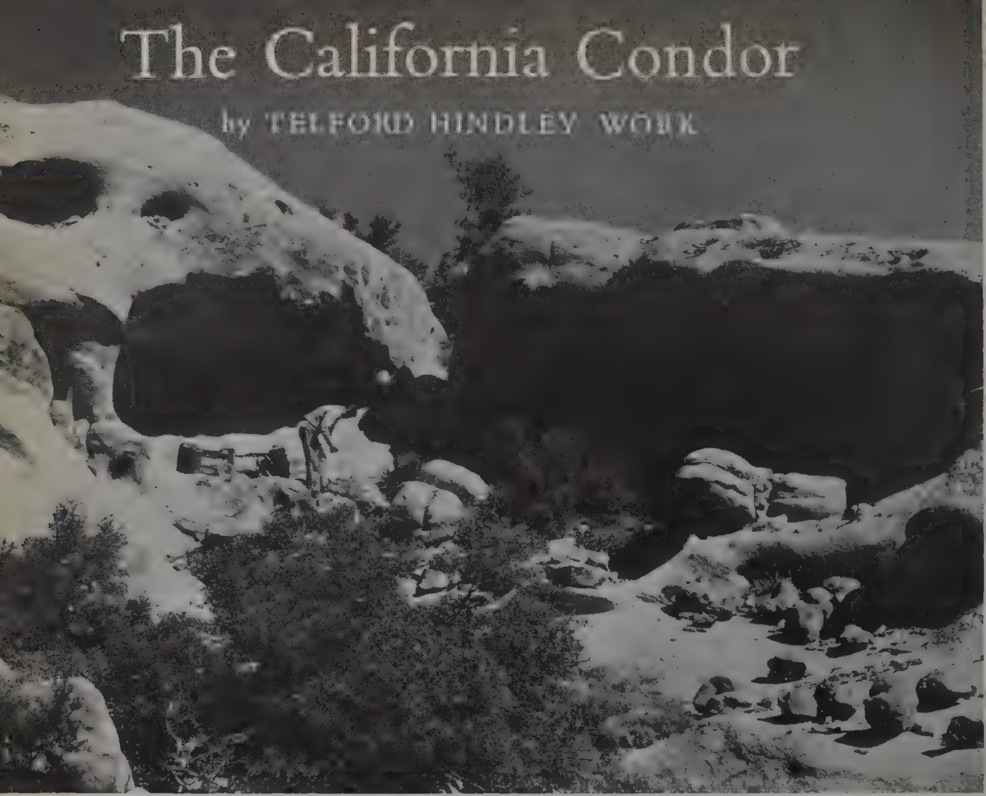
Brisbane lies a long way north, in the shadow of the Tropic of Capricorn. The city here, in square miles the largest in the world, is flung between hills and sea by a series of bridges, and its suburbs resist the dampness and heat by straddling the land on wooden stilts. The palms, Hibiscus, Frangipani and Poincianas of Brisbane are Australia's nearest urban approach to tropical lushness.

Western Australia, its capital Perth, stands slightly apart from the other States, its relationship to them rather like that of Wales to England, imagining itself neglected on account of its distance away from the centres of government and commerce, and in most spheres, sporting as well as administrative, probably being so. Perth, settled on the inner elbow of the Swan river, has an agreeably old-fashioned air. The streets are arcaded, trams rattle past hotels with circular wooden balconies supported on columns originally set up for the tethering of horses, and five minutes' drive in any direction except west takes you into the zone of red Jarrah trees, an inner circle to the bare, skeletal eucalypts that stalk their way into plain or desert.

Westward, however, the city spreads between park and river through suburb after suburb to the Indian Ocean. These suburbs, unlike industrial ones, suggest a refinement of urban living rather than a harshening of it. The houses, for the most part, are not pretty to look at, being bungalows with gnome-like variations, but they are bounded by peppermint trees and within sight or easy reach of sailing clubs and surf clubs. Much of Perth's civil building seems to have been created to gratify the whims of a Scottish landowner with Mexican leanings—Scottish baronial mingles happily with Spanish-Aztec renaissance, Edwardian gilt and plush interiors with cattlemen saloons, a University designed in the modern Swedish style with banks and offices of Victorian solidarity. But here and there under the cruising pelicans on the water's edge a white villa with blue jalousies juts out of the rock as though at Cap Ferrat, the yachts twisting on a burning evening under the cool Fremantle breeze, and Perth manages to unite all its apparently warring ingredients into a relaxed harmoniousness. The bush and the desert are not far beyond where the kangaroo paws and spider orchids, the flowering gums and the bottle-brush form a flame-and-blue barrier to the scorching winds of the interior.

The California Condor

by TELFORD HINDLEY WORK



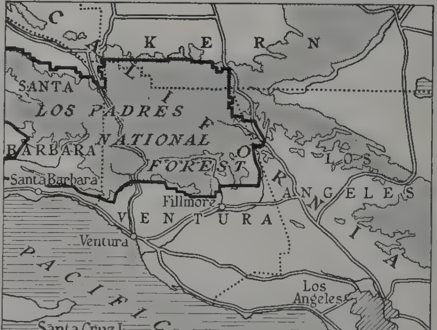
trations, except two, from the author

(Above) *The last refuge of the California Condor is in the wild and rugged mountains of southern California where erosion of the sandstone has provided fantastically shaped caves as nesting-sites*

The author acknowledges his great debt to Harold M. Hill and Albert J. Wool for their help in obtaining material and photographs for this article, as well as in carrying gear on many difficult trips

The California Condor was introduced to the literature of ornithology by George Shaw, Keeper of the Zoological Department of the British Museum, in a publication usually cited as "Shaw's Miscellany", published serially sometime before 1813. His description was based on a specimen, still in the British Museum (Natural History), collected at Monterey (California) in December 1792, by Archibald Menzies, botanist and collector who accompanied Captain George Vancouver on his explorations of the Pacific Coast. At that time this largest of all vultures and one of the largest flying birds in the world was not uncommonly seen in many localities all the way from what is now British Columbia in Canada to Baja California in Mexico.

How magnificent and almost supernatural they must have seemed to the early Spanish



A. J. Thornton

(Above) *Dr Karl Koford standing beside his hide overlooking "The Hole in the Wall", a tremendous cavern in a sandstone cliff which is a favourite roost of the condors; as many as twenty-seven of the estimated sixty left in existence have been seen there at one time. Dr Koford, who studied the condors under a National Audubon Society grant, is responsible for eliciting the facts which led to the preservation of this bird.* (Left) *Eroded potholes of various depths provide reservoirs of water in the condors' nesting area. Shallower pools near the brink of cliffs are used for drinking and bathing by condors. They normally feed on carcasses of dead range-animals and seem to prefer wild deer or domestic calves, although hunger often induces them to eat practically any carrion available* explorers of California, three hundred years ago. In 1602, when Vizcaino's ships sailed into Monterey Bay, his journalist-priest recorded observations of large turkey-like birds, possibly seen feeding on a dead whale carcass which had washed up on the Monterey shore. His measurements gave the equivalent of an eleven-feet-four-inch wingspread, which is in excess, by at least a foot, of any accurate measurements made of this bird in the past hundred years. But even so *Gymnogyps californianus* is thought to exceed the South American Andean Condor, its closest rival, by at least three to six inches in overall dimensions.

The finding of condor bones in the La Brea Tar Pits of Los Angeles indicates that this genus of condor was in its prime almost a million years ago, when it fed, along with half-a-dozen other species of vultures now extinct, upon the carcasses of mammoths and sabre-tooth tigers fatally mired in the tar.

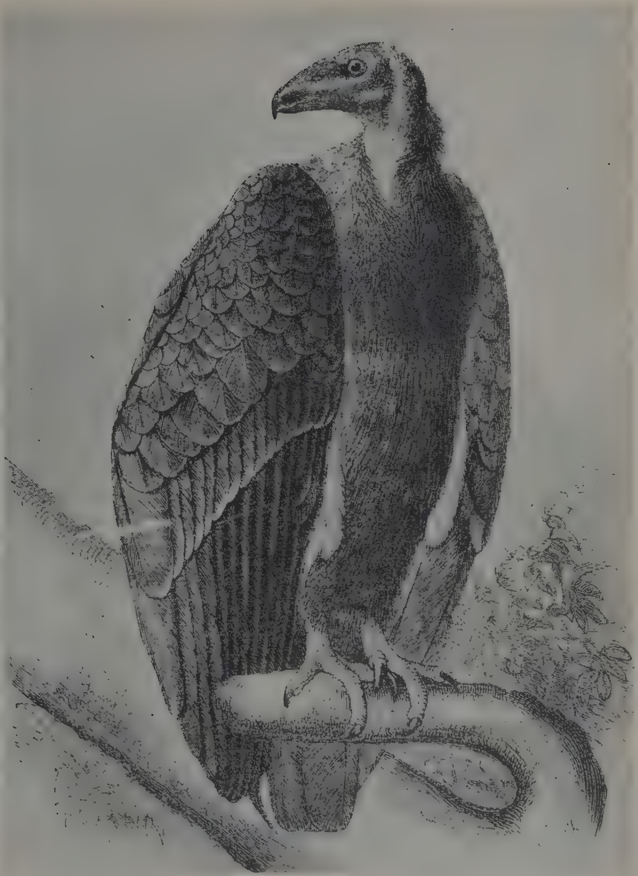
Our interest in the condor was a natural consequence of the several years we had spent studying the turkey vulture under the auspices of the Natural History Museum at Stanford University. We knew there were a few condors living in the wilds of Southern California and early one April we started into Los Padres National Forest near Fillmore to find them.

We set our course towards an area that we had studied through binoculars. All agreed that it was a likely spot to find turkey vultures and because of similar vulture habits therefore a possible roost for condors. By following the sandstone grooves, creek beds and cliff edges, we were able to avoid direct conflict with the dense underbrush part of the time. After

By courtesy of the Zoological Society of London

The California Condor: an illustration of 1797 in The Naturalist's Miscellany, *by George Shaw, which contains the first published description of this bird. It was then fairly common along the Pacific coast of North America from British Columbia to Baja California*

The first California Condor to reach Europe alive was a nestling raised in captivity in California and brought as a juvenile via the Isthmus of Panama to the London Zoo. This engraving of it is taken from the Proceedings of the Zoological Society of London, *1866*



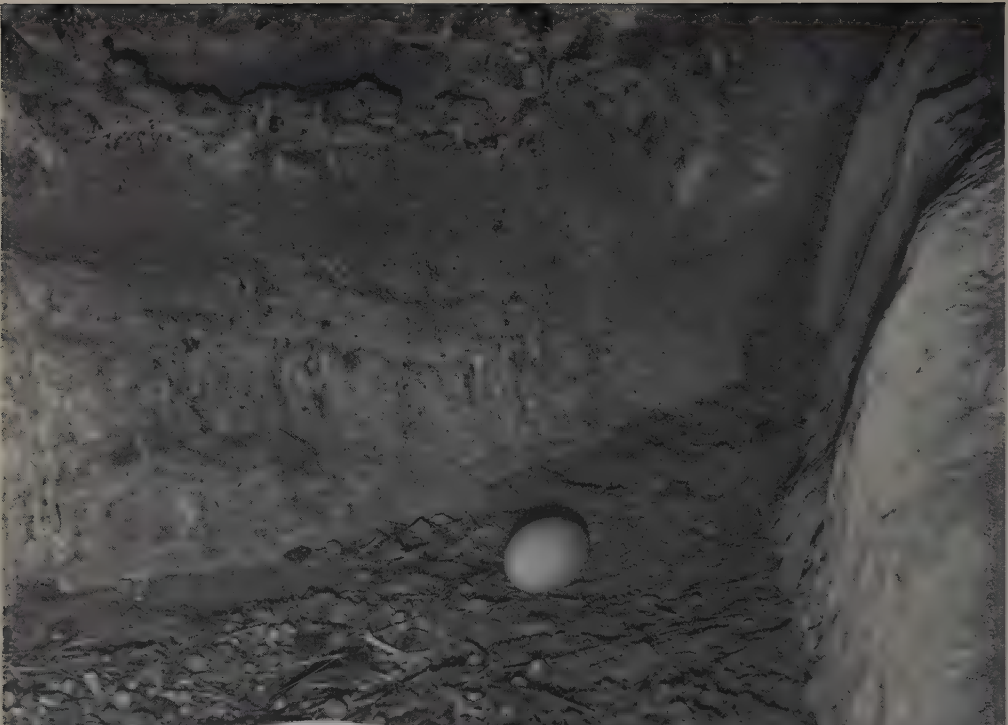
By courtesy of the Zoological Society of London

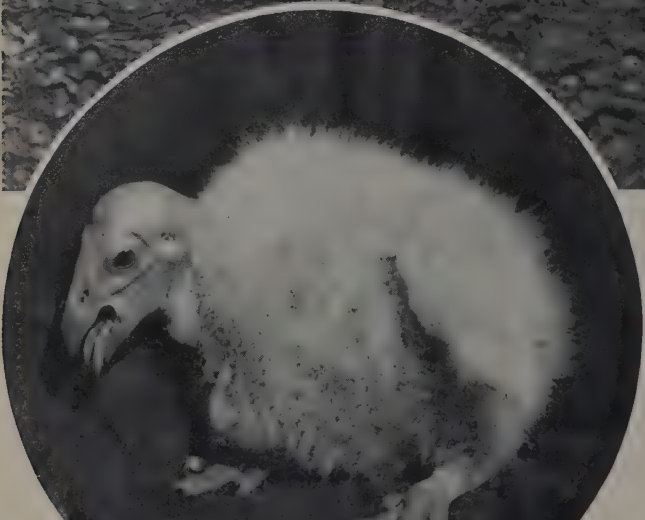
some distance our circuitous route brought us to a gulley that seemingly opened out onto the edge of the world. The suddenness of our escape from the maze surprised us almost as much as the sight we beheld directly before us. Less than a hundred yards away, standing on the edge of a cliff, were seven great black condors absorbing the sunlight and its reflections from the warm sandstone.

This meeting took both us and the condors by such complete surprise that we stood eyeing each other for the better part of a minute, before the birds pitched off the cliff and took to the air. Once on the wing, the gigantic birds were even more at ease and the seven of them wheeled about, apparently unafraid and extremely curious, as we made our way to the edge of the cliff.

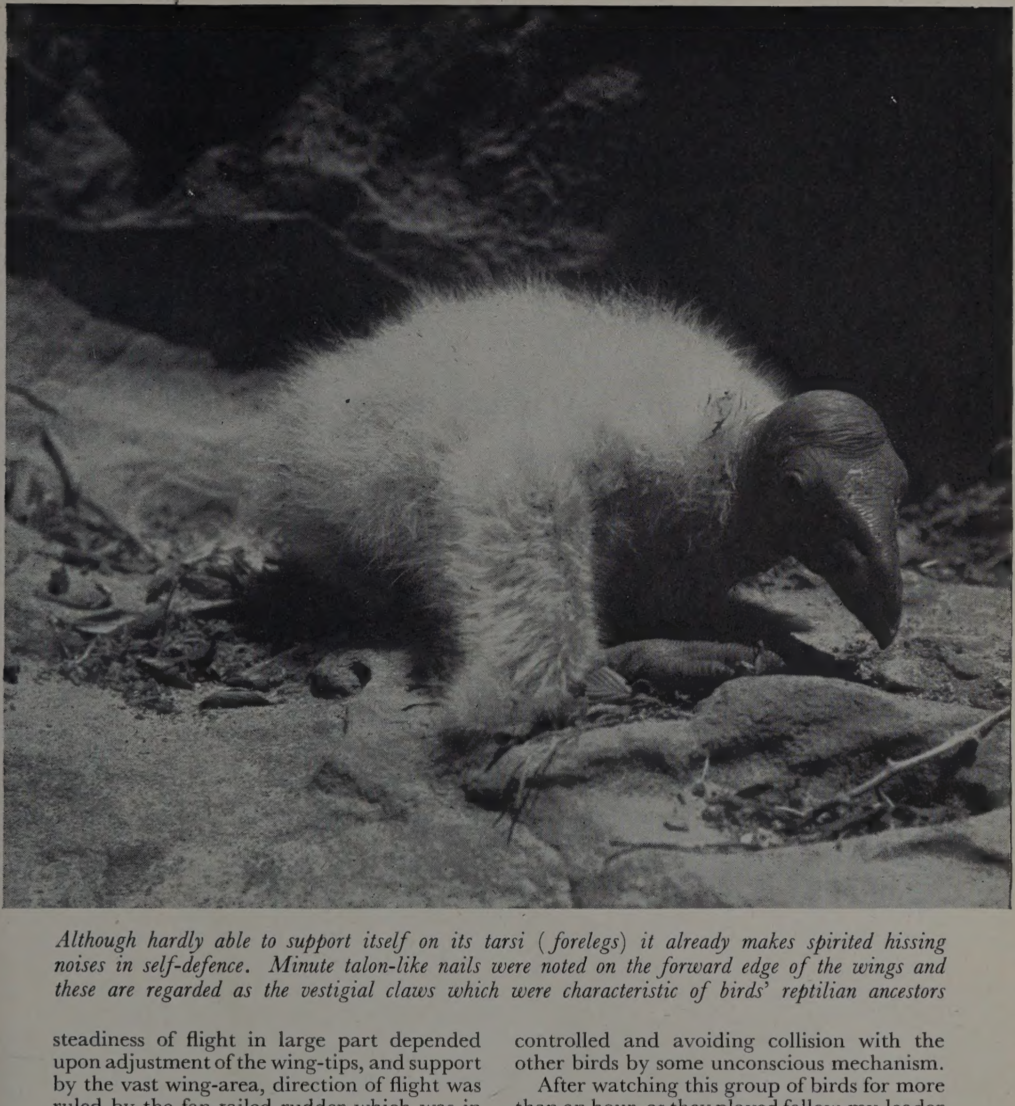
The gracefulness, the strength, the exquisite magnificence of their flight is difficult to describe. The very steadiness of their movement, as they soared through constantly changing air-currents, seemed uncanny. There was none of the unsteady rocking of the turkey vulture whose flight we had often admired. As a flyer, the turkey vulture seemed but a novice in comparison to this giant of the sky. We stood and watched as some swooped within fifteen or twenty feet of our position. Closer observation revealed the controlling mechanism of their flying. There were eight or nine long individual feathers extending from the end of each wing to form a slotted wing-tip.

The twenty to twenty-five pound weight of the airborne bird caused the nine to ten feet of wingspread to bow decidedly, with the "finger feathers" almost curling at the ends. Each feather efficiently subjugated changing air-currents to the use of the bird. While





(Above) *Instead of building a nest, the California Condor usually seeks a dark cave or deep pothole in a cliff. Here it lays a solitary egg on the bare ground, no oftener than once every two years if a young one is successfully raised. The faintly greenish-blue egg found in this nest was five and three-eighths inches long, the longest ever recorded.* (Left) *After an incubation period of six weeks or more, a downy white young bird was hatched. Here it is about five days old, with pale orange head and its crop distended after being fed on carrion brought to the nest in the crop of a parent*



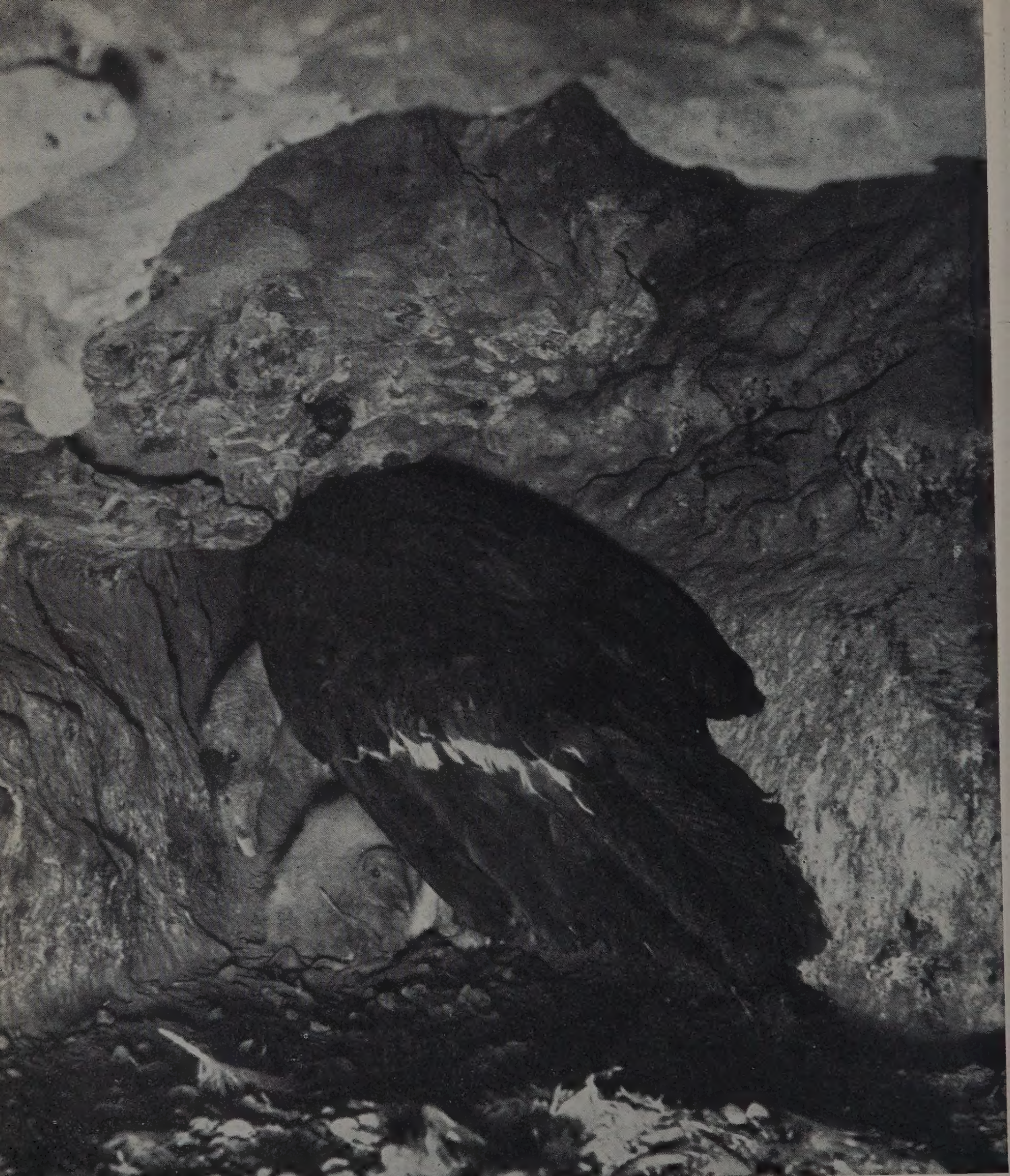
Although hardly able to support itself on its tarsi (forelegs) it already makes spirited hissing noises in self-defence. Minute talon-like nails were noted on the forward edge of the wings and these are regarded as the vestigial claws which were characteristic of birds' reptilian ancestors

steadiness of flight in large part depended upon adjustment of the wing-tips, and support by the vast wing-area, direction of flight was ruled by the fan-tailed rudder which was in constant motion up and down and from side to side.

As if it were a gondola suspended from a lighter-than-air craft, the condor's bald head moved with little regard to the flight operation of the rest of the unique structure. As the bird passed by us, the bare neck would extend as though made of rubber and the head would swing under a wing or around legs as the rest of the craft went blindly on, controlled and avoiding collision with the other birds by some unconscious mechanism.

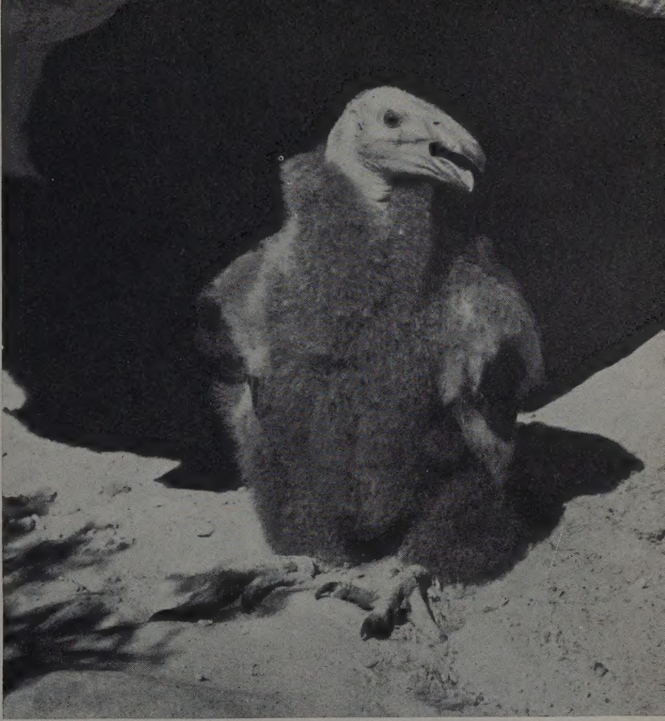
After watching this group of birds for more than an hour, as they played follow-my-leader and gyrated in circles, parabolas and figures of eight, they soared out over the canyon and returned for one last sweep before disappearing beyond the hills. This was the last curtain call and the show was over.

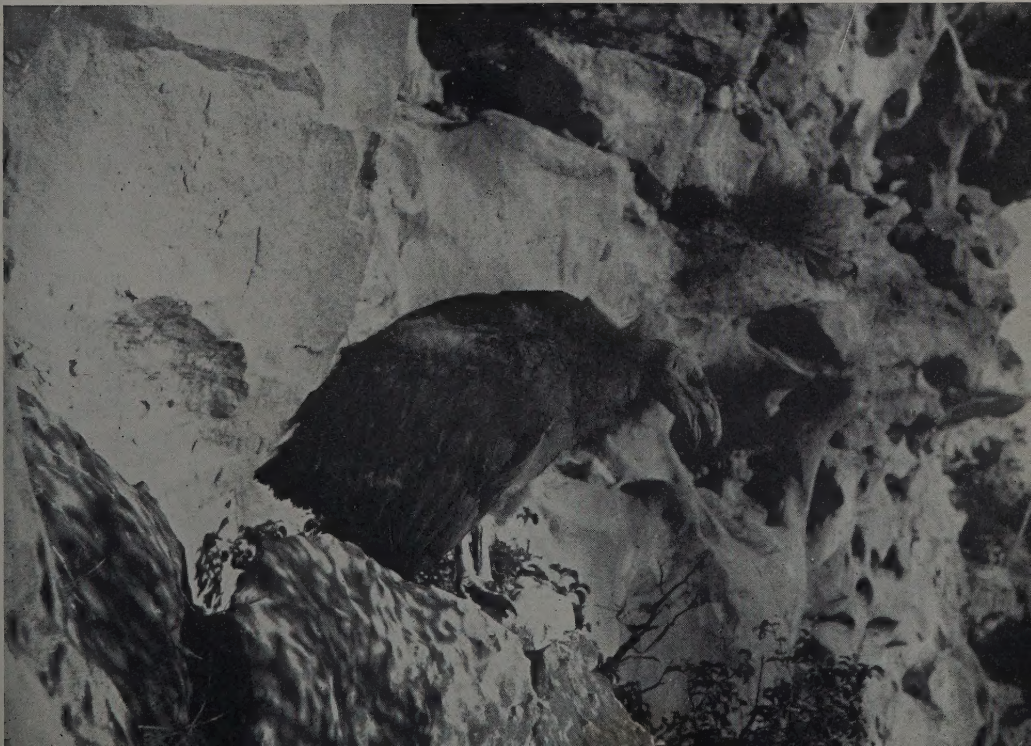
Back at the base camp, where we lived in the sheltered comfort of a cave with the possessive feeling of ancient troglodytes, we reconsidered our good fortune and decided that with so many birds present at this season there was



The young bird is brooded more or less continuously by one or other of the parents for almost three weeks after hatching but after that both adults go hunting at the same time, usually entering the nest in the early morning or in mid-afternoon to offer their nestling food which they may have stored in their crops overnight. This parent was found with the three-weeks-old youngster in the nest before nine o'clock one morning

(Right) *At three months of age the nestling is well protected with its second coat which is a heavy covering of grey down. This doubtless keeps it warm in the comparatively cool temperature encountered at elevations between 1500 and 4500 feet (the range of condor's nesting) while the parents are away hunting.* (Below) *At twenty weeks the bird was almost fully feathered and the skin of its head was changing to the shiny charcoal-grey of a juvenile. It had left the nest to perch firmly on its own feet on a neighbouring rock pinnacle before taking off on its first awkward downward flight*





The care and generosity of those concerned to preserve the California Condor from extinction is amply rewarded by the sight of one of these great birds soaring gracefully above the sanctuary

some prospect of finding an active nest, which was the object of our visit. Maps were brought out and studied to understand our geographic relationship to the surrounding terrain. With binoculars we could see cliffs all about us, but the maps, by indicating possible routes, were to save us many days of hopeless hiking.

The nest was ultimately located in a place much easier of access than most condor-caverns described. It was at the base of a cliff almost two hundred feet high, pock-marked with numerous crannies, potholes and caves. The entrance to the cave was ten feet high, easily allowing a man to stand inside, but twenty-five feet in it sharply narrowed to a dark chamber about three feet in diameter. On the level sand, barely discernible in the dim light, lay a single egg. In this protective gloom, the birds silently take turns incubating for weeks, imparting heat to one thin-shelled link to the insecure future of this distinguished species, to produce a youngster which develops as featured here in the pictures we took on subsequent visits.

It is doubtful whether the population of condors will ever increase much over their estimated present population of sixty because they are an archaic species which has barely managed to survive into an era of greater stress, disturbance and competition resulting from the persistent migration of man into western North America. However, with the creation of a fifty-five-square-mile condor sanctuary under jurisdiction of the U.S. Forest Service, there is reasonable hope that they will continue to soar peacefully over and nest in the heartland of their territory for many years to come. This results in large part from the efforts of America's leading conservation organization, the National Audubon Society, which sponsored the scientific studies on which protection is based, encouraged voluntary forfeiture of drilling rights in the area by private oil companies and through its educational work is rapidly maturing public attitudes towards the preservation of threatened natural assets. Americans are sometimes considered too materialistic to venerate anything magnificent and old but of no practical value. The survival of the California Condor refutes this accusation.